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PACIFIC GAS AND ELECTRIC MAGAZINE

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SAN FRANCISCO

VOL. 3 JUNE, 1911 NO. 1

CHALK BLUFF DITCH, DEER CREEK

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Pacific Gas and Electric Magazine

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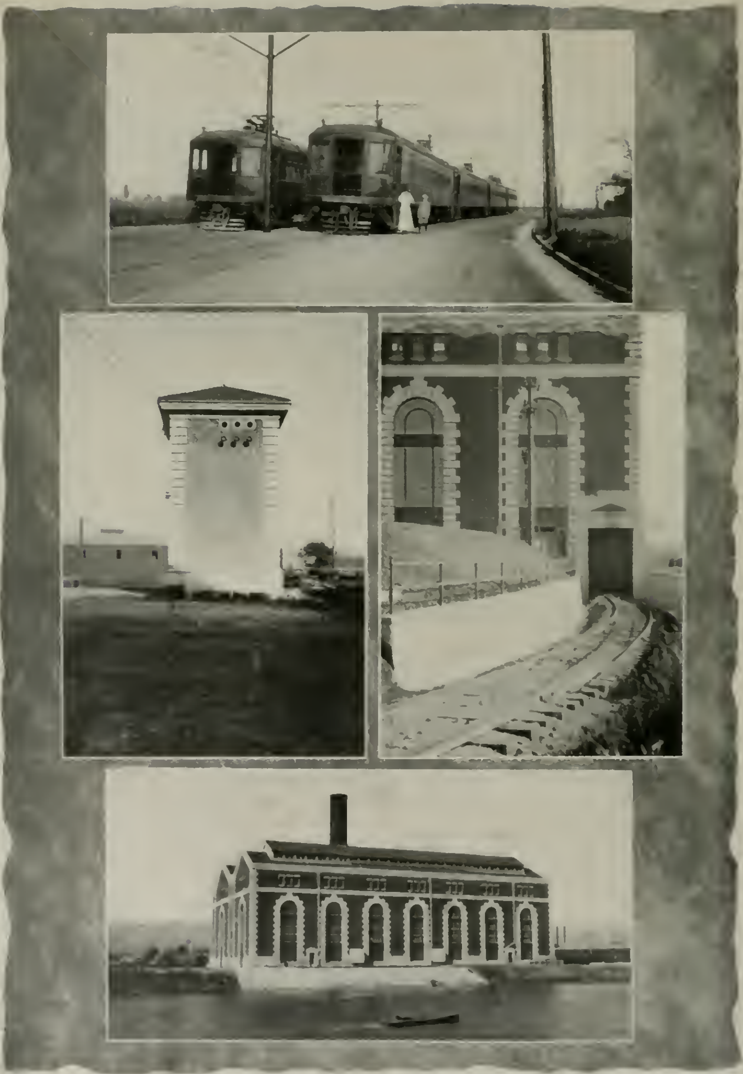

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Pacific Gas and Electric Magazine

VOL. III JUNE, 1911 No. 1

The Southern Pacific Power Plant

By C. F. ADAMS, Engineer Construction Department.

C. F Adams

For the past three years the engineers of the Southern Pacific Company have been constructing a large power plant at Fruitvale, at a point where the Horse Shoe line crosses the Estuary. This plant was designed to supply power for operating the suburban train service in Alameda, Oakland, Berkeley, and to the interurban and city lines in the San Jose and Los Gatos districts.

Track work and line construction are practically completed in Alameda, and the new east-end loop has furnished a try-out ground for the testing of train equipment and the training of crews, without interference with the regular train service.

To celebrate the inaugural of electric train service and the completion of the power plant, a banquet was given May 19th to, and followed by, a meeting of the American Institute of Electrical Engineers. The papers presented and the speeches given related to the general plans of the power house and system. Engineer A. H. Babcock in the opening address gave generous credit and merited commendation to his associates and assistants for their share of the work.

After the speeches the company was invited to inspect every detail of the plant from basement to roof. To illustrate the method of machine control and plant operation, a turbine and a rotary converter set were placed in operation. During the entire evening all trains on the Horse Shoe loop stopped at the power house for the convenience of the guests.

A brief sketch of the power house and its plans may interest some readers. The building is constructed of red brick with light cream brick trimmings. The steel frame and roof trusses support a roof of terra cotta tile. The main floor of station is of gray tile, designed to be impervious to oil and dirt. The gallery floors are of mosaic. The station walls within are painted in pleasing color designs of gray and buff. Glazed tile are used on walls and columns, for a height of six feet above the floor line. In the building design, good taste and practical utility are combined.

The power house provides space for the steam boiler plant, four steam turbines of 5,000 kilowatt rated capacity, six rotary converters of 1,500 kilowatt capacity each, with their transformers, space for a 60 kilovolt transmission equipment, and the necessary switchboard and switching equipment required for the complete handling of all circuits. A storage battery of ample size insures current for exciter service and also for switch control, when exciters are not in serv-

See Notice to Employees, page 35.

55,000-Barrel Fuel Oil Tank

ice. Facilities are provided for the storage, cleaning and pumping of transformer oil.

A 55,000-barrel steel tank contains the fuel oil required for boiler use. The condensers receive water from the Estuary through a gravity flow concrete tunnel. Practically all the steam auxiliaries have a duplicate system of piping, and no expense has been spared to insure service. The current supplied to the trolley system is 1,200 volts direct current. The current supplied to the substation is 25 cycle alternating current at 13,200 volts.

The power lines leaving station take two different routes. One set is carried underground to the main line right-of-way, and thence to the West Oakland substation. A second set is carried across the Esutary, using marine cable, and from the cable switching house the lines run overhead on high trussed steel poles to the Alameda car barn. From there, again crossing the Estuary, this time using an overhead construction and steel towers 250 feet high, these lines terminate at the West Oakland station. This station is designed to supply current for the heavy service on both the Oakland and Alameda Moles. A feeder also extends to the Berkeley substation.

For the trolley support, Catenary suspension is used, and the trolley mechanisms are of the pantagraph type. The car construction is the latest type of steel car. The seating capacity has been increased about twenty-five per cent by the type of seat and arrangement adopted. The entire roadbed in the suburban districts has been rebuilt for the heaviest traffic.

Two steam turbines of 5,000 nominal kilowatt rating are in service now, with space for two more in the present building. For future extensions of power plant capacity the present buildings will be increased in length. The entire installation is so permanent in character and so pleasing in design and finish, that it constitutes a worthy example of the engineer's art.

The results obtained illustrate the value of a single engineering head, and also the value of the hearty co-operation of his assistants. The engineers of the Pacific Gas and Electric Company were among the guests and enjoyed the good things the installation and occasion afforded.

Efficiency

By C. H. DELANEY, Department of Operation and Maintenance.

C H Delaney

There is no word so familiar to engineers, and of such wide application, as the word "efficiency."

There is thermal efficiency, mechanical efficiency, electrical efficiency, commercial efficiency, the efficiency of a pump, the the efficiency of a motor, the efficiency of an automobile, and of perhaps greater significance than any, the efficiency of a man.

The simplest definition of the word efficiency is "Output divided by input," that is, energy utilized divided by energy expended. Thus if a dynamo converts 10 horse-power of mechanical energy into 9 horse-power of electrical energy, its efficiency is nine-tenths, or 90 per cent. Efficiency is always less than 100 per cent because we can never get quite as much useful energy out of a machine as we put into it; some energy is always used up in the machine, or dissipated in a form that cannot be used.

It is the ambition of the engineer to bring the efficiency of his machines up to as neear the ideal 100 per cent as possible, but it is not generally known just how far short of this ideal he falls. While some classes of machines may approach within 2 or 3 per cent of the ideal 100, the most useful of all machines, the steam engine, utilizes only a fraction of the energy delivered to it. The reason for this is obvious when we consider how hot the steam would have to be to give a high efficiency. To attain an efficiency of even 50 per cent in a perfect steam engine it would be necessary for the steam to enter the engine at a temperature of over 2,000° Fahrenheit. This is about the temperature of an ordinary fire, and would mean that the engine itself and the pipes leading to it would become red hot and be ruined in a few minutes. Possibly in some future period a suitable material may be discovered that will stand such temepratures, but in the present state of human knowledge we must be content with lower temperatures and consequently lower efficiencies. Thus it comes about that the best efficiency obtainable from a modern steam engine is not much over 20 per cent, and for a complete power plant, including boilers, engines and auxiliaries, we consider we are doing well if we obtain 12 per cent efficiency. In other words, less than one-eighth of the heat energy in the fuel is turned into useful work; all the rest is wasted.

The efficiency that appeals to the business man is not so much the energy efficiency as the dollars-and-cents efficiency. Will it pay to discard an old machine and install a more efficient machine in its place? This is the question he asks, and it can only be answered by determining the cost of making the change and the profit to be derived from it. The new machine will have a larger output than the old for the same expenditure of fuel and labor; but the total input is also greater for the new machine, by the amount of the interest and other fixed charges on the extra investment, so that the commercial efficiency may be the same or even less than it was before. Similarly when there is a choice between several types of machine the *commercial efficiency* will determine whether it is best to install the most expensive machine or a cheaper and less economical type.

Just as the choice of machines depends on their efficiency, so the choice of men depends on their efficiency. Men, however, have this advantage over machines: they can improve their effiiciency by their own efforts. A great deal has been said in the last few years about training of workmen, and many engineers are devoting themselves exclusively to this problem. Books have been written on motion study and scientific management. Every operation has been carefully analyzed, and men have been trained to follow new methods so as to accomplish the same results as formerly with fewer motions and less fatigue. All of this has for its one object the increase of the men's output and consequently the raising of their efficiency and through them the efficiency of the whole factory.

Fortunately we do not have to wait for the efficiency engineer to come along and show us where we are wasting energy. Each man can study the principles of efficiency for himself, and apply them to his own work. The man in the shop can improve his efficiency by having his work placed in the most convenient location, and by having his tools within easy reach. The man in the office can improve his efficiency by training his fingers to move mechanically while his mind is occupied in planning his work. Some men waste energy through thoughtlessness and careless mistakes—others by thinking too much and accomplishing too little. Each man must study the problem for himself, bearing in mind that the greater his output of useful work the higher will be his efficiency.

Electricity as a Help to the Dairyman

Mr. C. E. Sedgwick, manager of the recently created Solano District, has sent in some very interesting news items and statistics, showing the results obtained from what he terms "electrical irrigating."

As an example of what may be done in the irrigated district around Suisun, Dixon, Elmira, etc., attention is called to the fact that five years ago Mr. H. R. Timm, a farmer's boy, with a college education, decided to apply science to farming. He established a certified dairy with eight cows, and his father and the other farmers of the old school, predicted his early failure. Today he is milking over 250 cows, ships over $6,000.00 worth of milk a month to San Francisco, Oakland, Berkeley and bay points, and has the largest certified dairy in the State. He has 75 horse-power motor capacity installed in pumping plants, ice machine, etc.

His own farm is not sufficient to supply all his feed, so he has to buy. This has acted as an incentive to others to raise alfalfa, and this district is rapidly becoming one of the most productive irrigated alfalfa sections of the State.

Mr. Timm has not escaped competition, and there is already a second certified dairy established by Hutton Brothers within the last few months, and three more are under way. In these large dairies, good management and sanitary conditions are the secrets of success.

Upper left-hand cut shows a modern dairy ranch home.

Absolute cleanliness is the slogan of a certified dairy, and the main corrals are concrete as an aid in accomplishing this condition. These corrals are hosed off twice a day, as likewise the milking barns, and all refuse removed is conveyed to a sump, thence onto the land by means of an electric pump. This is carrying out Pinchot's conservation policy to the limit. Everything taken from the land is returned to the land, and the dairy may be considered as a factory which turns water into milk.

The upper right-hand cut shows a cylindri-

cal concrete ensilage container. While silos have been used for a great many years throughout the Middle Western States, they have only recently become a factor in the dairy business in California. Green alfalfa and other feeds are placed in these silos and allowed to ferment, forming a sort of a "bovine sauerkraut." This is used in the winter, and is an excellent substitute for green feed.

Center illustration shows an alfalfa field during the harvest season.

Lower left-hand cut shows a cow and several of the young calves in one of the corrals.

Lower right-hand cut shows the discharge of water from one of the numerous electric-driven pumping plants in this section. The particular plant shown herein is of ten horse-power capacity and has been in operation for seven years. The cost of maintenance and repairs during that time has not exceeded $5.

A slight idea of the wonderful progress made within the last several years in this section, can be gauged by the following statistics, showing the number of electric irrigating plants recently installed. For the eight years previous to May 1st, 1910, there were 35 of these pumping plants with a total of 437 horse-power. Since May 1st, 1910, or a period of one year, 27 additional plants have been placed, with a total of 447 horse-power, and this development of one of the finest dairy sections in the State, has just begun.

R. J. C.

* * *

The above photo was forwarded to the main office by Mr. C. E. Sedwick, Manager of Solano District. The Company automobile was decorated specially for the May Day Festival, held in Dixon on the 1st of May, 1911.

California Securities and Their Growth in Popularity

By CYRUS PEIRCE, Western Manager of the Banking House of N. W. Halsey & Company.

The following article is one contributed by Mr. Peirce to a series in SUNSET MAGAZINE, *entitled "Talks on Pacific Coast Finance."*

DURING the last five years there has been everywhere a constant complaint of the increased cost of living, and writers who have attempted to deal with the subject scientifically have talked learnedly about the decrease in the value of the dollar.

While to everybody this is the cause of serious annoyance, it bears more heavily on those who depend upon fixed incomes from investments than it does upon the wage-earner or the man in general business. The wage-earner has demanded and received constant increases in pay, which, while they may not entirely offset the increase in the cost of living, at any rate enable him to in a measure keep pace with it, and the business man or storekeeper simply marks up the prices of his commodities to meet existing conditions, and the consumer still pays him his profit.

The person depending upon a fixed income from an invested principal has none of these methods of "getting even" with this game that is apparently "fixed" to beat him. In may cases he (or more often she) has no method of adding to income by earning additional money, and therefore must necessarily face either the problem of a closer and more rigid economy or of taking what appears to him to be a speculative risk in order to obtain higher rates on invested capital.

This applies almost entirely to the eastern part of the country and such conservative communities as eastern Pennsylvania, New Jersey and New England. People who lived in real comfort ten years ago on a capital of $100,000, invested in high-grade bonds that netted four per cent per annum, today find this income far too small for even their real necessities, and having been educated to a frame of mind that anything that pays over four or four and one-half per cent is necessarily risky, find it difficult to look with favor on securities far from their own doorsteps.

Ten years ago some of the braver individual investors, though with many misgivings, began to buy gas, electric or street-railway bonds. Many of these bonds at that time bore six per cent interest, and were purchased at par or under. Owing to the consolidation of the various properties or their purchase by large holding companies, the original issues became underlying mortgages, and while they may not have had an active market, they have been entirely safe and satisfactory and have yielded to their owners an income materially above that returned by municipal or railroad bonds purchased at the same time.

This process of consolidating and mortgaging of public-service corporations has been carried on to such an extent throughout the East and Middle West that it is rarely now that an issue of underlying or first mortgage bonds can be obtained at anything like a reasonable price. The experience of investors in the junior securities of some of the large corporations which have been organized by speculators with political affiliations has not been altogether satisfactory, and therefore the conservative investor is now facing the alternative of either purchasing municipal and railroad bonds at a comparatively low rate of interest or of going further afield in order to obtain adequate income.

See Notice to Employees, page 35.

During the period that this country has been builting up an investible surplus and creating an investing class, its growth and development has been so rapid that the average investor has been able to profitably employ his funds comparatively near home, and therefore he has been extremely provincial in his ideas, while his English brother, who, as the product of an older civilization, and the inheritor of wealth rather than its creator, has been forced to go to all corners of the earth in order to remuneratively employ his capital.

Ten, yes, even five years ago, if a first mortgage bond on a California public-service corporation was offered in the markets of the East, ninety-nine out of every hundred investors would exclaim: "Too far away!" Education was necessary in order to convince them that absolute security existed here; that the physical resources of the country were such as to guarantee an adequate return and that the laws of the State afforded sufficient protection.

During the last few years the development of the Pacific Coast has outstripped the predictions of even the most optimistic of its upbuilders. For instance, in 1902 there was formed at Fresno, California, a corporation to take over the electric lighting business of the town and to build a hydro-electric plant on the San Joaquin river. This corporation issued bonds to the extent of $800,000, which were deemed ample for the purpose intended. In 1905 the company found that after having spent the entire proceeds of the bond issue, the development of the territory had been so rapid that they were facing a much larger expenditure for increased plants and greater distributing systems. They proposed at that time to authorize a new mortgage securing $1,500,000 bonds, using $800,000 to retire the previous issue, and have $700,000 to spend for new plants and equipment. After some argument, they were persuaded to make the new mortgage on the basis of an issue of $1,500,000, with an equal amount reserved for future extensions, making a total authorized issue of $3,000,000.

The officers of the company thought this was unnecessary, but acquiesced, and it was done. By the spring of 1910, the entire $3,000,000 of bonds were issued and the proceeds spent in providing for the demand from the company's customers, and they were again up against the proposition of providing for further large expenditures and further development. This time, profiting by their former experiences, they decided to do their financing on a permanent basis, and authorized an issue of $25,000,000 of bonds, of which $3,000,000 were reserved to retire the prior issue and the balance issuable for extensions and new construction. In the meantime, the $3,000,000 issue which had originally been sold materially below par, has considerably advanced in value with the increase in the earnings of the company and the fact that it has become a mortgage underlying the recent large issue, and there is every prospect that it will still further increase in price. That this increased development was based upon a legitimate demand, and therefore permanent, can be easily demonstrated by the fact that the population in the territory served by this company has increased over eighty-seven per cent during the ten years from 1900 to 1910.

Probably the most striking example of the development of an industry and the increase in security and popularity of its various issues of bonds, caused by the growth of a territory, is that of the Pacific Gas and Electric Company, a corporation second only to the transcontinental railroads in importance in the State of California.

In 1896 the development of hydro-electric properties had just commenced on the South Yuba River. It was impossible to interest the investing public in bonds to be sold for the purpose of building these plants, and the securities were taken by a few individuals who had confidence enough to back up their foresight, and today, fifteen years afterward, with these little plants simply infinitesimal atoms of a large and prosperous corporation, those original six per cent bonds have not yet passed half of their life and are buried so deep in the tin boxes of conservative investors that it is impossible to dislodge them.

To tell of the growth of this corporation from the little 1,000 horse-power plant originally constructed by the proceeds of $300,000 of bonds to the present system with its $89,000,000 of outstanding securities, has required a printed book of nearly three hundred pages, so it is utterly impossible to condense it into the limits of a short article such as this; but we will bring out a few of the important features.

The development of the two little plants on the South Yuba River gave their builders such confidence that they formed a company to build a 20,000 horse-power plant on the same river and to bring the power generated to Oakland, a project that was hardly deemed feasible by many engineers. This required the issuance of $2,250,000 of bonds, which were originally sold with difficulty. The demand for electric power was then created and required the development of other properties and the issuance of other first mortgage bonds, the sale of which was equally difficult, and they were largely sold by the promoters of the company to their personal friends by personal persuasion.

By 1901 these individual companies had become so well established that they were merged into the California Gas and Electric Corporation, which was organized for the purpose of concentrating and developing the business. The California Gas and Electric Corporation then issued $10,000,000 worth of bonds and the various divisional first mortgage bonds became underlying issues and rapidly increased in favor, so that practically all of them sold at a premium, this being facilitated by the easy money conditions which then existed in California, even though the California Gas and Electric issue itself was regarded as highly speculative. This was accomplished without any material financial help from other parts of the country, and in fact at this time it would not have been possible to sell any large amount of California securities in the East.

The company continued to develop until 1905, when the Pacific Gas and Electric Company was formed by the consolidation of the San Francisco Gas and Electric Company and the California Gas and Electric Corporation.

The rebuilding of San Francisco caused a tremendous development in the manufacturing enterprises of California and a consequent demand upon the Pacific Gas and Electric Company for power and light, and this again necessitated a refinancing of the California Gas and Electric Corporation by the issuance of a unifying and refunding mortgage of an authorized issue of $45,000,000, which provided for the refunding of all underlying issues and provided funds for large additional development. The company in the meantime was becoming widely known throughout the world, having been a pioneer in long-distance transmission of electrical energy, and a mortgage of this size naturally attracted the attention of investors elsehere, so that as the demand for money was continued, the company's facilities grew with it, the result being that now the securities of the company are widely known in international markets.

The growth of this company has done more to demonstrate to the eastern investor the security and the value of California bonds than any other one thing. He has seen, easily within his memory, issues of bonds which he contemptuously refused to buy, as "being too far away" or "too speculative," not only increase in value but yield their owners a comfortable return, which will continue up to the maturity of the bonds. He has seen larger junior issues which were condemned as the height of folly practically disappear from the market. He therefore becomes a good candidate for a proper educational campaign, and is willing to at least consider the purchase of our securities. In some cases he has been so eager as not to give due consideration to what he was buying, but has been tempted to invest in the construction of enterprises without regard to the necessity for their creation or the market for their output. This has brought grief, and he has had to learn the same lesson as investors in other fields—that careful selection is as essential in California as elsewhere, and that because a proposition is in California does not necessarily make it successful.

Nothing can permanently impede the growth of California. Its future passes realization, with its two great valleys of proven fertility, heretofore held in large individual holdings, and with its innumerable smaller valleys sheltered by protecting hills from unfriendly winds, it possesses the potentiality of extreme agricultural development and the support of an intensive population unsurpassed anywhere.

Increased population means increased development; increased development necessitates increased railroad and electric railway facilities, the development of power companies, irrigation companies, and other public and quasi-public corporations.

Gas Rates in Latin American Countries

Company in Guayaquil Pays 15 per cent Dividends

Consul-General Bartleman reports that gas in Buenos Aires costs 8 cents per cubic meter, about $2.40 American gold per 1,000 cubic feet, for lighting, and one-half that price for power purposes.

Vice-Consul-General Guyant writes that the new gas factory at Mexico City charges 5 cents gold per cubic meter, with a discount of 10 per cent to the average consumer and further discounts to large consumers until the lowest net rate reaches 3 cents per cubic meter, about 90 cents per 1,000 cubic feet. The gas is made from the abundant crude oil in Mexico.

Consul-General Dietrich states that the gas company at Guayaquil, Ecuador, charges 20 cents silver per cubic meter, about $3 American gold per 1,000 cubic feet, plus 40 cents silver, about 20 cents gold, for rental of meter, and the internal revenue stamps required to be affixed to all bills receipts, etc. The gas company has a capital of $150,000 gold, with a $75,000 reserve fund, and in 1909 paid a dividend of 15 per cent, passed $15,000 gold to its reserve fund, and distributed $3,500 among its employes as a gratuity.

—*San Francisco Call*, May 15, 1911.

Retribution

In Saltpetre Avenue, close to the Pit,
Where the vitriol reservoirs sputter and spit,
There's a bed on a griddle that never gets damp,
Prepared for the chap who encloses no stamp.

At the Molten Hotel, in the Sulphuric Glade,
Where the temperature's nine-ninety-eight in the shade,
There's a thrice-heated chamber, dug out with a scraper,
For the fellow who writes on both sides of the paper.

Where the billows of brimstone delightfully roar,
And the geysers their seething, red cataracts pour,
There's a blistering bath in a cauldron of flame,
For the chump who neglected to sign any name.

By Joe Lincoln, in the *Boston Herald*.

The Jubilee Incubator Works

By J. O. HANSEN, Superintendent San Jose Power Division.

SUNNYVALE, on the Coast Branch of the Southern Pacific Railroad, is rapidly coming to the front as a manufacturing center. It is a town of two thousand population, situated in Santa Clara County about nine miles north of San Jose, is the home of several large factories, one of which is the plant of the Jubilee Incubator Works, owned and operated by W. A. Bessey and Son.

The incubator consists of a lamp, a compound boiler, and a coil of pipe encircling the egg chamber. The heat from the lamp rises and makes a double turn around the boiler before passing out through the flue. The water, being heated, rises and passes through the pipe coil in the egg chamber, makes the circuit, and returns to the boiler to be re-heated.

When the egg chamber reaches the required temperature a regulator responds to the heat and regulates the flow of water and, at the same time, raises a vent valve. This regulating valve maintains automatically an even heat at all times. It is claimed by the makers that it is impossible to overheat or "cook" the eggs.

The machine is well made and finished, the legs being Oregon pine, heavy and strong. The body is made of California redwood. The egg chamber is lined with heavy wool felt which is covered with a non-absorbent paper. The case is finished with several coats of filler and varnish, making a well-finished and attractive article. The machinery for manufacturing is all operated by electric motors, the current being furnished by the Pacific Gas and Electric Company. More than thirty skilled workmen are employed every day. The pay roll amounts to over $2,500 per month, the greater part of which goes to the merchants of Sunnyvale.

A violin with a string out of tune is of just as much use as an employe who is sore at his boss. Harmony is the keynote of success.

—*Buck's Shot.*

See Notice to Employees, page 35.

Ancient and Modern London

As Viewed by GEORGE SCARFE, Superintendent Nevada Power Division.

George Scarfe

To one who has been a reader of history, the City of London, the metropolis of the world, is naturally a point of much interest.

The writer had the pleasure of sojourning there recently for a brief period, and the thought occurred that a short description of a few items that most impressed me would also be of interest and entertaining to the readers of this magazine.

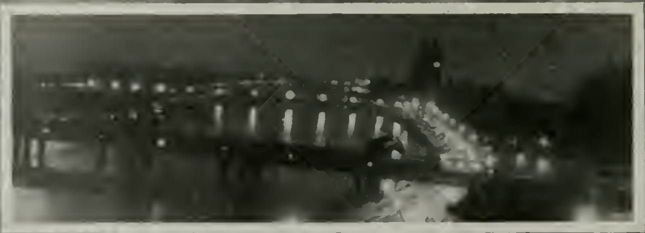
The London of today with its well-paved streets, its underground railways extended and electrically operated; its motor busses and electric tramcars, is very different from what it was a few years ago, when the steam locomotives underground choked and begrimed one, and the horse-drawn busses and trams made it almost impossible to reach any point in a reasonable time. Today one can travel in comfort, and at a speed that we in America hardly thought possible for the sure but slow-moving English to attain.

From the Strand it is possible to take a motor buss, for a nominal sum, to points that a short time back would call for a trip on the railroad; it costing but 24 cents to Hampton Court Palace, some 17 miles; the route being through a beautiful country, passing villages (with their thatched-roofed and quaint-gabled houses) that are now brought close to the city, and have taken on a life that seems out of place to them. It is rather unique to see a row of motor cars of all descriptions, drawn up in front of the "Horse and Hounds Inn," getting water for the radiators, while the passengers are still able to partake of ale in the same old-style tankards as did the travelers of a century ago, who with their horses and hounds stopped on the return from the hunt at the same old hostelry.

From Hampton Court the return can be made on one of the pretty little steamers up to Westminster. On this river trip we saw many points of interest; first we passed "Kew Gardens," where there is one, at least, of every discovered plant or tree growing; either in hot-houses or out in the beautiful grounds. We saw the madrone and manzanita here, marked —"A native of California." Up the river we went over the course of the Oxford and Cambridge boat races, which is of interest to every native of England, at home or abroad. Then we passed the great reservoirs that supply the city; then looming up on the left bank is the great station of the "Underground railway," something new amongst the old; thence along past the Embankment, with the "Lambeth Palace" on the right; then the Houses of Parliament on the left; with Westminster Bridge near the point where we went ashore. We are now on historic ground, and a few minutes' walk took us to Westminster Abbey, the various government buildings, the Strand, Fleet Street, Trafalgar Square and Buckingham Palace, the town royal residence. Just over the Westminster Bridge, in sinking for a foundation, there was lately found intact, in the old River mud, a Roman galley, which seemed of more interest on account of the beautiful monument to Queen Bodeacia, the barbarian monarch who fought so long and well, but in vain, to save her island from the invaders.

On another buss you can, in a few minutes, reach the Bank of England, the Royal Exchange, Mansion House, London Bridge and the Tower of London. At the latter, while one passes up the stairs and into the prison rooms of people who made history, and when we know they made the trip over the same steps to the point of execution, and to the block which we see, and note the marks left by the axe, we seem to be carried back to the

1. Bridge over the Thames and River Steamer
2. Tower of London
3. Monument to Queen Bodeacia



1. The Thames Embankment
2. Midnight Picture showing Houses of Parliament, Westminster Bridge and River Thames
3. Double Deck Street Cars

time when such things were possible, and one feels on coming out of this gloomy place, that he was favored in being born in the present age instead of then.

Within a hundred feet of the Bank of England I saw more maps together, with other information on central California and our own Pacific Gas and Electric Company, than I have seen in any other single place. This shows how closely the entire world is being drawn together, and that our Company is known and looked upon, in Europe, as one of the greatest undertakings, grandly and successfully carried out.

Going back to the trams, we find them all with underground trolleys, as in Washington and New York, but different, in that they are double-deckers, and move with an absence of noise unknown to us. This is, of course, due to the road-bed. No confusion exists, there are no accidents, and they come and go silently and quickly. There is a law which prohibits carrying more passengers than can be accommodated with seats, and although it is annoying to wait for a car that can take you to your place of destination, it is, however, a great satisfaction to have a seat, and not be annoyed by strap-hangers standing in front of one. The underground trains run in separate tubes for each track, and the cars being of such a size as to almost fill the tube, they drive out the air in front of them and draw in fresh air from the streets they pass by. This system furnishes fine ventilation, and the difference is noticeable as compared with New York, where all tracks are in one open roadway, and there is no displacement of the air.

One of the pictures here presented was taken at midnight from the window of the hotel, and shows the lights on the embankment, Westminster Bridge and Houses of Parliament, with the historic clock in the tower; the great "Big Ben." This, with the reflection of the lights in the River Thames, makes a picture of unusual interest.

National Electric Light Association

Possibly our readers may not be familiar with the fact that all employees of either the Pacific Gas and Electric Company, or the San Francisco Gas and Electric Company, the former including, of course, all subsidiary companies, are eligible to Class B membership in the above association. Many of our local managers, heads of departments, and others, are now members, and it occurred to the writer that if this were more generally known that many more of our employes might like to join.

Class B members have all of the privileges of Class A members, with the exception of the right to vote and to attend the executive sessions, except where they attend as the accredited representatives of a member company. There are no initiation fees, the dues being five dollars per annum, which entitles the member to receive the Bulletin of the Association, and also the bound volumes of the Proceedings at the end of each year. These books alone are of sufficient value to more than repay the members for the money expended in dues.

Should any employes desire to join, I will be glad to forward the necessary applications for them to fill out.

George C. Holberton,
Member of the Membership Committee.

The following appropriate stanza appeared as a foot-note on an application for gas in the Oakland District:

"We'r waiting for the Gas man,
On Avenue Seventy first.
We'r still a burnin dirty coal—
It couldn't be much worse,
So we'r lookin for the Gas man
Who writes the cheerful ad
About the Joys of Gas Life
A thing we've never had."

See Notice to Employees, page 35.

"Carissimo-Mio"

By J. W. HALL, Manager Stockton Water District.

J W. Hall

The stage from Hangtown drew up at the Chute Camp Landing, along, about noon. Alighting from the vehicle there were three or four stalwart Lumber Jacks on their way to the timber. Next there came a large cage containing a chattering parrot, and last of all a stout Spanish Senora of some forty summers, clad in cheese cloth garments of complimentary hues. The team seemed restive, and excited, and while being taken from the harness, the horses kept turning their heads, and showing the whites of their eyes, as if in anticipation of some alarm.

The stage driver rubbed the muscles of his arms, shook his fist at the parrot exclaiming, d—— that pah'rt he scared the team so bad they nearly got away from me on the last pitch. Every time I forgot him and popped the whip, he swore sumthin scan'lus, and the team got afraid and nearly pulled my arms out."

"Wh, he couldn't out-swear you, Bill, could he?" said the hostler. "Well, you see," replied Bill, "he swore in seventeen languich, and I can only swear in one." "Now, Bill, how many languages did he swear in—how could you tell?"

"Well, he swore in Spanish, he swore in United States, he swore in Dago, and he swore in Greaser."

"Now, that is only four languages."

"Oh, you dry up; he swore enough in them four to beat any seventeen."

The lady smiled, and the parrot, indifferent to the compliment, cocked his head on one side, then on the other, looked down on the seething torrent flowing below, then at the tramway and cable crossing, and the suspension bridge; then at the narrow strip of sky visible half a mile overhead, and seemed to think he had gotten into the wrong place, and he vented his opinion of it in strong terms. And the lady only smiled and, carressingly soothed him in Spanish terms; calling him "Carissimo Mio."

All hands presently moved to the cookhouse shack and partook of a substantial mountain dinner; after which the luggage was transferred to the tramway car and the travelers established themselves on its shaky platform.

The Senora was accorded the center seat, and for fear of an accident, she was tied fast to the seat. She insisted upon holding the parrot's cage and grasped firmly by the ring at the top, and by the bars at the side, and her pleasant voice could be heard as they begun the ascent, reassuring him that there was no danger and that on the *manana*, they would be at home and in content.

Everything went well until half the ascent of the 3,500-foot rise was made against the side of the canyon. By that time the torrent had dwindled to a thread; the men working about the landing looked no larger than ants, and the passengers began to realize that they were hanging between earth and sky; only a slender line on which the car was suspended being responsible for their safety:—that, and the man at the top who operated the hoist.

The lady suddenly became dizzy and let out a few shrieks, but continued to clutch the cage in a vise-like grasp. The startled parrot became voluble, and swore scandalously again. The other occupants of the car held the lady fast, but she collapsed in terror on the seat. The man at the engine above, hearing the swear words come tumbling over each other, imagined that there was some deadly conflict going on, on the approaching car and prepared for the worst. But as the car reached the top and settled on an even keel on level track, he was much relieved to find that there was no carnage, but only an excited parrot, a helpless lady, and some distracted men.

The lady was carried over into the shade, still clutching the cage, and was soon revived by being copiously sprinkled with water. Half an hour later the party was on its way to the woods, on the return logging train.

The parrot became the pride of the settlement upon its arrival. Slippery Jim, recognizing him as a new source of amusement, soon ingratiated himself with Polly by feeding him sweets, and began teaching him a few new languages. Polly acquired education fast even for a parrot, and would talk an hour for a lump of sugar, but profanity seemed to be his long suit. Any distracting noise would set him going in all his vocabulary. The Spanish lady had sequestered him from a bird fancier in the city, without being fully acquainted of his bad traits. The first stunt put up by Slippery, with the connivance of the Senora, would have made a good subject for a moving-picture show.

In the quiet of the first evening after early candle light, in Estrada's home, was heard the sound of blows and then fierce invectives. "Slippery" aroused the camp. "Estrada ought not to beat his wife up that way; at least not in the first night of her arrival in camp." He soon had an angry crowd assembled, who hurried over to remonstrate.

The door was burst open. There sat Estrada, calmly smoking his cob by the fireplace. The Senora was laughingly beating up a round steak for supper, and the excitable parrot was doing the rest. The chagrined crowd cheered the parrot, but "Slippery" was made to pay for it.

"Slippery" was soon exercising his ingenuity in getting up more amusement out of Polly. He borrowed the cage and took him over to look at the bull team, but there was nothing doing. Polly's clamor fell on deaf ears. Also the camp burro. The latter seemed to recognize and old friend, and was glad to meet up with the bird.

During the night the mill caught fire, and although it was put out before much damage was done, some adjoining shacks caught fire from it, and were quickly burned down. Amongst them was Estrada's home.

This second excitement in one day was too much for the smiling Senora's weak heart. She was taken ill and succumbed an hour afterwards, and her unhappy husband was bereft of his help-meet and the parrot of his mistress. Within a day or two the remains were prepared for the return journey to civilization for interment. Sincere was the mourning, and sad and pathetic the funeral cortege. The very large pine box which contained the coffin, when loaded on some logging truck, seemed to nearly cover it. The chief mourners were the bereaved husband, "Slippery Jim," and the parrot. The latter, in his cage, was perched on top of the box as the train moved away, amidst uncovered heads, and the parrot was swearing softly in four languages.

Few influences are more powerful than work. Labor of whatever kind, well done, is honorable; its mark is a badge of honor. Work is a need. It is a blessing. The angel that stood with flaming sword at the gates of the Garden pointed the way to man's salvation. It is work, business, that binds together the scattered strands of our vital activities and points the way to ultimate grace, and the achievement of that spirit of brotherhood and co-operation without which man would be but a naked savage in the wilderness.

It is not history which teaches conscience to be honest; it is the conscience which educates history. Fact is corrupting—it is we who correct it by the persistence of our ideal. *Amiel.*

A Sane Fourth of July

This caption is becoming a slogan throughout the United States, and the matter of a sane Fourth of July is being particularly advocated by the National Fire Protection Association of America.

Within the past ten days, the cities of Oakland and Stockton have passed ordinances, making it a misdemeanor to indulge in the usual insane and reckless celebrating, by the use of fire-works, in commemoration of our national holiday.

Strenuous efforts are being made throughout the nation to entirely eliminate this form of celebration, which in years gone by has been the means of killing and maiming thousands of men, women and children, and causing millions of dollars in losses by fire; incidental to the careless handling of fire-works.

The readers of this magazine are requested, both individually and collectively, to do their share toward making our next Fourth show a lesser number of these fatalities.

R. J. C.

STATISTICS OF INDEPENDENCE DAY

YEAR	DEAD	WOUNDED	TOTAL
1903	466	3,393	3,859
1904	183	3,986	4,169
1905	182	4,994	5,176
1906	158	5,308	5,466
1907	164	4,249	4,413
1908	163	5,460	5,623
1909	215	5,307	5,522
1910	131	2,923	3,054
	1,662	35,620	37,282

THIS Year, 1911, How many are to be slaughtered?

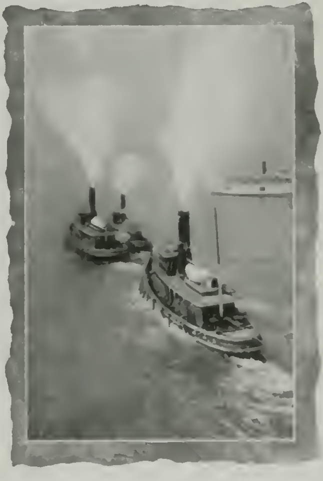
The Glorious Fourth Courtesy of Life.

Lesson in Team Work

By GEORGE SCARFE, Superintendent Nevada Power Division.

IN the early morning of April 28th, of the present year, the great turbine steamer "Mauritania" was slowly moving up the Ambrose channel and river to her dock. It was my good fortune to be a passenger, and as we passed up the river, it gave me great pleasure to explain the various points of interest to some of those that were getting their first sight of our shores.

To the traveler, the sight of home scenes is one, if not the greatest, of pleasures, no matter what has been seen in other lands; even when, as in my case, the land visited was the birthland. Still the sight of the adopted country afforded the greatest pleasure. The country of possibilities beyond all others, especially in our line of work.



As the great ship approaches her dock, it is necessary to turn at right-angles to place her in her berth. This cannot be done under her own power, and it is necessary to use tug-boats to accomplish this work.

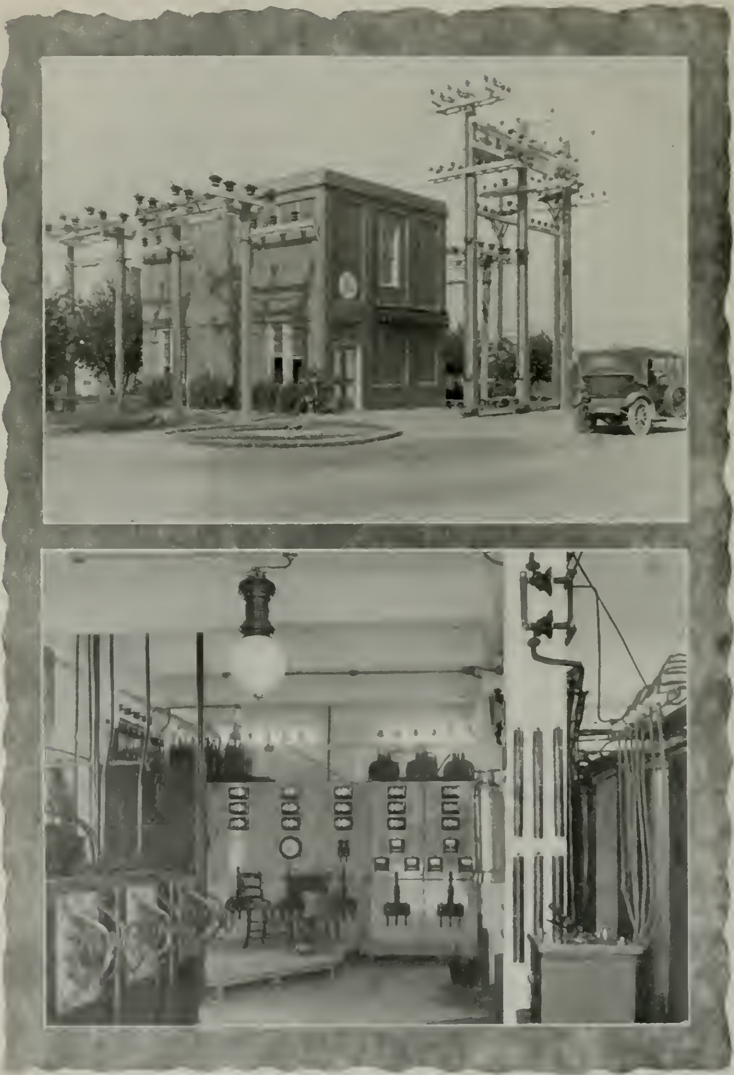
My attention was called to them by the noise made, and on the first sight of their work my thoughts were of a phrase we often hear used by our Vice-President and General Manager, viz.: "Team Work." I at once made a picture of these tug-boats, as they strained under their burden, which shows what can be done by pulling together; no matter what the resisting force may be. Here a great 38,000-ton weight gives in to the persistent efforts of the few little tug-boats no larger than the life boats carried on her decks. It was a lesson not to be forgotten, and proved to me more than ever the meaning of the expression so often repeated at our meetings—"Team Work."

The Advertising Hen

When a duck lays an egg she just waddles off as if nothing had happened.
When a hen lays an egg there 's a —'ll of a noise.
The hen advertises.
Hence the demand for hens' eggs instead of ducks'.

Respectfully dedicated to Petaluma District.

See Notice to Employees, page 35.



Exterior and Interior Views of Mountain View Substation

The Mountain View Sub-Station

By J. O. HANSEN, Superintendent San Jose Power Division.

J. O. Hansen

The requirements of industry and demands of civilization in the southern part of the San Francisco Peninsula brought forth the Mountain View Substation. The building is of reinforced concrete, erected in the fall of 1906, at the same time as the 60 kilovolt Davenport line which receives its current through this Substation.

The Substation is located on the bank of Stevens Creek, near Old Mountain View, and one-fourth mile from the San Francisco road, also being on the road from Alviso to the San Francisco road.

Electric current is received over two circuits of lines to Ynigo Ranch where the Standard lines from Mission San Jose to San Francisco are tapped. It is also tied in with the Redwood Substation by the 11 kilovolt line feeding the Palo Alto and San Mateo Substations and consumers directly off this 11 kilovolt line.

Three 500 kilowatt transformers step the voltage down from the 60 kilovolt lines for the 11 kilovolt service. These are connected in star on both primary and secondary side, regulators being inserted on the grounded leg of the secondary 11 kilovolt side. With these a very close regulation of voltage is obtained. For local distribution another bank of three kilowatt transformers are used to step the voltage down from 11 kilovolts to 4 kilovolts.

Water for cooling transformers is obtained from a 125-foot well, piercing the artesian strata. On account of the elevation, the water rises to within fifty feet of the surface. Nearer the bay, which is four miles away, there are many flowing wells taking water from the same strata.

The Substation lot is covered with apricot trees, and about the station flower beds have been laid out. The Pacific Gas and Electric Company trade mark has been outlined in front of the station with Santalina flowers.

* * *

The store front of the Santa Rosa office was very neatly decorated during the recent Rose Carnival, and the Company was awarded a prize on this account.

Alterations are being made in the show window which will allow the demonstrating of appliances much more effectively than has been possible heretofore, and in addition a gas arc has been installed in front of the store, which permits of fine night illumination and has caused much favorable comment from all who viewed it.

See Notice to Employees, page 35.

Pacific Coast Gas Association

OFFICE OF THE SECRETARY
445 SUTTER STREET, SAN FRANCISCO

The Pacific Coast Gas Association has enrolled on its books 357 members, and at this time everything indicates that when the Nineteenth Annual Convention, which will convene at Oakland, California, on September 19th, 1911, is called to order by President Leach, our membership list will have reached the 400 mark.

The papers to be presented before the coming meeting will be of more than passing interest to the gas fraternity at large.

The Officers and Directors for the Association for the current fiscal year are:

PRESIDENT	FRANK A LEACH, JR., Oakland, Cal.
VICE-PRESIDENT	WM. BAURHYTE, Los Angeles, Cal.
SECRETARY AND TREASURER	JOHN A. BRITTON, San Francisco, Cal.
AST. SECRETARY-TREASURER	HENRY BOSTWICK, San Francisco, Cal.

DIRECTORS

HENRY E. ADAMS	Stockton, Cal.
H. W. BURKHART	Los Angeles, Cal.
E. C. JONES	San Francisco, Cal.
JOS. M. BERKLEY	Los Angeles, Cal.

For the sake of "Auld lang syne" we will state that the first meeting of the Association was held at San Francisco on July 11th, 1893, in the office building of the San Francisco Gas Light Company with the following Officers and Directors:

PRESIDENT	JOSEPH B. CROCKETT
VICE-PRESIDENT	J. L. HALLETT
SECRETARY AND TREASURER	JOHN A. BRITTON

DIRECTORS

JOHN S. KANEEN	JOHN MATHER
F. H. EICHBAUM	JOHN KEMPF, JR.

The following announcement has just been made by the Association:

NINETEENTH ANNUAL CONVENTION

Oakland, California, September 19th, 20th and 21st, 1911

At this early date President Leach prognosticates that the Nineteenth Convention will surpass all previous meetings, not only in papers to be read, but in every other detail.

However, in order to bring about this happy event, we must not lose sight of the fact that our President must have the hearty co-operation and support of all members; for after all is said and done, the success of our Conventions rests wholly with our members, and with their co-operation and support there can be but one conclusion,—"Success."

Don't forget that John D. Kuster, of San Jose, is our Experience Editor this year, and Mr. F. C. Millard, of Los Angeles, our Wrinkle Editor. These gentlemen are in a very receptive mood, and would like to hear from all members. We all surely have experienced some new experiences, or run across some new wrinkles during the past year, and its along these lines that Mr. Kuster and Mr. Millard are looking for information. Get in touch with them.

Don't forget that new life in the Association is essential for its future welfare, and it is up to all members to do a little field work with a view of swelling our ranks. Application blanks can be had from the Secretary's Office.

Yours very truly,
JOHN A. BRITTON,
Secretary.

Authorized Additions and Improvements

GRASS VALLEY: Present street-lighting system, consisting of 7.5-ampere arcs has been ordered changed to tungsten system.

MARIN DISTRICT: A 15-kilowatt I. R. T. automatic regulator has been installed at Fort Baker.

SACRAMENTO DISTRICT: Twenty-one additional arc lamps have been ordered installed by the city.

SAN JOSE POWER DIVISION: Work has been commenced on construction of eight miles of sixty-kilovolt line to furnish service to Spring Valley Water Company's plant at Calaveras Dam.

SOLANO DISTRICT: Reconstruction of distribution lines at Dixon has been commenced in order to give continuous service at that point.

Reconstruction of distribution line to Winters has been commenced in order to give continuous service at that point.

REDWOOD DISTRICT: Purchase of automobile for use of Superintendent of Electric Distribution has been authorized.

CONTRA COSTA DISTRICT: Work has been commenced on building of distribution lines in San Ramon Valley from Walnut Creek to Danville.

SAN JOSE DISTRICT: Extension of primary line of Almaden Road for a distance of approximately six and one-half miles has been authorized, to take care of prospective business in that vicinity.

Extension of primary line on Monterey Road for a distance of approximately seven miles has been authorized, to take care of prospective business in that vicinity.

The Company has just completed the extension of a 60,000-volt line to the site of the large Calaveras Dam which is being built by the Spring Valley Water Company, in Alameda County. This dam will be one of the largest structures of its kind in the West and will probably take three years to build. Electric power will be used for operating pumps for sluicing off the dam site, for operating concrete mixers, hoisting machinery, and for railway and other purposes. The total amount required will probably be in the neighborhood of 3,000 horse-power.

During the past month an extension of the Company's 4,000-volt distributing system from Walnut Creek to Danville, a distance of seven miles, was begun. This line will supply service to a large number of small farms in the vicinity of Danville, as well as to the residents of the town.

Extensions of our distributing system out from San Jose in several directions have been authorized. One extension will go in a southwesterly direction towards Saratoga, one in a southerly direction along the Almaden Road, one in a southeasterly direction in the vicinity of the main Monterey Road, and one in a northerly direction to Milpitas. The already famous town of Milpitas will now be classed among our most modern cities, owing to the fact that electricity will be available for all purposes in the town. All of the above extensions are being made into highly developed agricultural sections where berries and garden truck are grown in abundance and where water is being pumped for irrigation.

A contract was closed during the month with the San Jose Water Company for operating a large pumping plant in the City of San Jose. The Water Company heretofore did all of its pumping by a steam plant, but is now installing a modern electrically driven plant.

The Commercial Man and His Possibilities in the Gas and Electric Field

By JOHN B. REDD, Contract Department San Francisco Gas and Electric Company.

COMMERCIAL Man, that is a pretty broad term, but that is the kind of man who makes a success in selling gas and electricity for Domestic and Industrial purposes. He is a man capable of thought, always on the job, and who greets his customers whether financiers or small fruit venders, with a pleasant smile and a happy How-do-you-do; a man who can suggest to the public methods of and reasons why they should be up to date in the use of gas and electricity.

Proper installations of either gas or electric appliances will make friends for the Company and for the man who secured the order. After a useful installation has been made, the customer wonders why the convenience was not put to use long before. The gas and electric salesman has an article to sell, in which everyone is more or less interested. The Salesman who knows his business very rarely leaves a prospective customer without imparting certain information, creating new ideas, and if he is "wise" will leave with more knowledge of the other fellow's business, which enables him to return at a later date with something new.

There is a dearth of good Commercial men in almost every Community for the simple reason that many of the beginners consider their job is only temporary, and in a few months expect to sell all the gas and electricity that will be needed in their district and think their services will be no longer required. On the other hand a large number of the old Solicitors think they know all about the business and plod along day after day putting in the required number of working hours, taking it as a joke if you suggest study or thought of the business after working hours. Some may say this type is of rare occasion, but how many of you read gas and electric journals? I dare say there are a large number of solicitors, for gas and electric companies, who do not even know the names of the leading magazines or journals pertaining to their line of business. These journals each month contain articles entirely too valuable to pass unnoticed, and I believe this is one of the best methods for obtaining information and to keep the mind refreshed with arguments for securing daily contracts.

A live Commercial Man is not afraid to ask questions or occasionally make a mistake. The answers "put him wise," the mistakes teach him caution, and give experience that enables him to handle the more difficult propositions. The saying that "A man who never makes a mistake is the man who never does anything," holds good here as well as in other lines of business.

The "Live Wire" does not allow himself to fall behind; he keeps up with the times, and only by constant thought and study. The Commercial Man today is recognized as one of the greatest assets to the public serving corporations; he is a recognized medium between Company and Consumer, and a medium here to stay, as is shown by the large number of big positions they are constantly snaring with their technical brothers.

The time when the Commercial Man was looked upon as a "Hot-air Merchant" is past; today he must deliver the goods and get down to "brass tacks," as he is daily meeting prominent business men who are equally as "wise" as himself. The opportunities of the first-class Commercial man are many, as the field is getting larger each day.

and a greater demand being made for high salaried men who "know the game" and can accomplish results.

Study, talk, stick, thought, and smile; these five words, if properly used, will get results, and, if followed closely, will, in time, produce the right kind of a man fitted for commercial work, and useful to gas and electric companies as a business getter.

"Amber" Light

Electrical World, Sept. 22, 1910.

The People's Gas Light and Coke Company, of Chicago, is attracting some attention by extensive advertising of "Amber Light—A New Discovery." The "new discovery" is a Welsbach mantle that does not give a greenish glare. A house to house campaign to demonstrate the advantages and possibilities of the "new light" is announced.

The poster which stands on the information counter this week reads—

"Wait and have a cup of tea
And an oyster fricassee;
Can't soil my gloves
Or coat or skirt
Gas is so clean—
So free from dirt."

A German coming in the office one day last week, after paying his bill, was attracted by the neat lady in the poster; he walked over to the counter and attempted to read the verse. Evidently it was a struggle, but after studying it for some time he strolled over to the desk in the corner, where he sat down and waited as if for something to happen. After some little time had elapsed, the information man approached him, inquiring if he could be of any service to him. "No," said the German, "I'm joost waitin' to have a cup of dot tea you make mit gas." It took some diplomacy to explain the advertisement without giving him offense, but he took it good-naturedly, and the expression on his face as he left the offiice might indicate that we may expect a few of his friends to sample "dot cup of tea."

—By S. A. Wardlaw, S. F. G. and E. Co.

Location of Meters in Apartment and Office Buildings

American Gas Light Journal, Sept. 26, 1910.

The Supreme Court of Washington holds that a rule promulgated by the gas company that, in apartment houses or other buildings where a large number of meters must be installed, the company may have a meter room on each floor instead of installing meters in each apartment, is reasonable.

In erecting a three-story apartment house in Seattle, the owners were told to provide for meter rooms to cover the twenty-seven apartments. They refused, went into court, and lost.

In the meantime the company has installed a single meter in the basement; and the Supreme Court says the owners of the building may have an order making this arrangement mandatory.

Heat Unit for Gas in St. Louis

Electrical World, July 21, 1910.

The Laclede Gas Light Company, St. Louis, has requested the passage of a municipal ordinance to change the basis of measurement from a candle-power to a heat unit charge.

At a dinner in Brooklyn, N. Y., February 25th, Charles W. Pierce, Editor of the *Electrical Review*, said:

"I make the prediction, based on knowledge of important experiments, that the day is not far distant when the coal pile in the cellar will be replaced by the electrical reservoir of box-like shape and moderate size, to furnish heat throughout the entire building and also to the kitchen in residences, for cooking.

"And this will be done economically compared with coal, as this accumulated electricity will be stored at low cost and be on tap when needed. I am hopeful that this will be realized before we meet again, one year from now.

"Then will the coal wagon in front of the house disappear, the furnace caretaker lose his vocation, and the ashman become a reminiscence."

Pacific Gas and Electric Magazine

PUBLISHED IN THE INTEREST OF ALL THE EMPLOYEES
OF THE PACIFIC GAS AND ELECTRIC COMPANY

JOHN A. BRITTON - - - - - - - EDITOR
A. F. HOCKENBEAMER - - - BUSINESS MANAGER

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445 Sutter Street, San Francisco

The Pacific Gas and Electric Company desires to serve its patrons in the best possible manner. Any consumer not satisfied with his service will confer a favor upon the management by taking the matter up with the district office.

VOL. III JUNE, 1911 No. 1

EDITORIAL

IN THE PRESS OF TODAY there is to be noticed a changed attitude towards Public Service Corporations, and it is more particularly noticeable in the Press of the Eastern States, due to the wide publicity given, (in some cases voluntarily by Public Service Companies themselves) through hearings had before the several Public Service Commissions instituted in many States, and by very general advertising.

The remarkable part of this change of attitude, is the frequent allowance by Public Service Commissions to Lighting Companies of a raise in their rates, without the usual clamor against the Companies.

Publicity has benefited Lighting and Transportation Companies by informing the public of a very great injustice to most of this character of industries in the wide variance in taxation as between them and industrial corporations. The latter paying a very small percentage of their gross for taxation, while Public Service Corporations have to bear the brunt of the expenses in their several States in a very heavy tax, and the allowance of this tax as a matter of operating expense forces the burden back upon the people, while Industrial Corporations, without ability on the part of any Commission to fix prices charged for their commodities, escape a large share of the burdens which they should carry, while the public bears the burden.

Through this publicity education, is confirmed the belief of managers of large corporations serving the public, that a well regulated monopoly in public service matters, is of more benefit to the people than unregulated competition, and this opinion is being shared in by the thinking men of today, and is being voiced strongly by those who make our laws.

In a recent decision by the Massachusetts Board of Gas and Electric Light Commissioners, it indulges in the following:

"An electric light company has no necessary or legal monopoly of the territory which it serves. If it is not properly or adequately performing its public duties, a situation arises which may not only justify but require this Board to admit a competitor. But with this restriction the prevailing opinion, based upon experience, has been that the community as a whole will be more adequately and economically served by one company than, in the language of the Supreme Court, by as many companies or persons as may be minded to put wires in the streets and try their luck."

While the above refers to an electric lighting company, it is equally pertinent in the case of gas companies.

It is our opinion that the day is fast approaching in California when restrictive Legislation will confine the service to the people of lighting, power and railways, to a regulated monopoly, from which the communities served will derive essential benefits in many ways, among which will be a reasonable percentage of the gross revenues which will compensate more than the present tax on franchises, or the regulation of our present Law, giving the income of these companies to the State, rather than to the portions of the communities which it supplies. It will also, in reduction of the number of administrative departments in Companies in reduction of duplicated means of service, give a warranty of reduction in prices generally; if for example one Company can and does give adequate service to a community at an investment cost of say $100,000.00 upon which it is permitted to earn a reasonable rate of return, why should the investment at $300,000.00 be permitted for the same service, and the public compelled to pay interest of $300,000.00, for which it has no use.

Where competition unrestricted exists, as in this State, more annual damage is inflicted upon the pavements of a city, than is compensated for by any momentary advantages gained to the public by a competition which, after all, does not reduce prices any lower than they would be reduced by a State Comcission dealing with a regulated monopoly.

From the records of the past, it is an undeniable fact that in all cities in California where a company operated without competitors, it did so because of its fair and impartial treatment of consumers, and because it indicated a willingness at all times to share equally its profits with the public, by voluntary reduction in its rates whenever the growth of the business warranted such reduction.

A Collapsible Mantle—The "Sirrah"

London Journal of Gas Lighting, Aug. 16, 1910.

The mantle, put on the market by J. W. May Co., London, is not patented, but is prepared by a secret process. It is shaped and collodionized; but notwithstanding, it is so pliable that one can fold, twist or drop it, and commit all manner of violence without injuring it in the slightest degree. After maltreatment it can be restored to its natural shape without showing any signs of the deformation to which it has been subjected.

Important Rate Decision in Massachusetts

Electrical World, July 7, 1910.

The Massachusetts Gas and Electric Light Commission has issued an order under date of June 27 reducing the price of gas from 90 cents to 85 cents on the system of the Charlestown Gas and Electric Co.

In discussing the rate making problem the board says: "In a proceeding against a company for a reduction in price, evidence which merely calls attention to prices elsewhere is not conclusive as to the fair rate for the respondent company."

In the case of two adjacent companies the relative sizes of their outputs is one of the principal factors to be considered in rate adjustment. In this specific case the petitioners urged a reduction in price chiefly on the ground of the 80 cent rate in other portions of the city of Boston. The Boston company is selling about 20 times the amount of gas the Charlestown company sells, on the other hand the Cambridge and Somerville companies have many commercial similarities and they sell gas for 85 cents, therefore the price of gas in Charlestown was reduced to 85 cents.

At a local high school the instructor in the physics laboratory, during a course of instruction, asked a bright looking student the difference between electricity and lightning.

The young man seemed doubtful for a minute, then brightened up and said, "Well my father doesn't have to pay for lightning."

"And did you call on that woman for her gas bill today?" asked the manager of the office.

"Yes, sir," replied the green collector.

"And what did she say?"

"She asked me to take a chair."

"And did you?"

"No; I told her you wouldn't accept anything but money in payment."—Philadelphia Times.

History Repeats Itself

By W. R. MORGAN, Superintendent of Gas Distribution, San Francisco.

W. R. Morgan

At the third annual meeting of the Indiana Gas Association last January, Mr. A. S. Cook, of Terra Haute, in the course of his remarks, spoke as follows:

"*We are at present experimenting with what might be called an emergency tank. It is an ordinary thirty-gallon, galvanized iron water tank, into which we compress gas at about eighty pounds pressure, and, in the case of a plugged service, which can not be relieved, owing to the lateness of the hour, we hook on the tank and give the customer at least light enough for an evening's use.*"

This excellent idea dates back almost two hundred years, its first appearance being recorded by Sir James Lowther, of Whitehaven, England, in a paper read before the Royal Society in August, 1733.

It appears that while sinking a shaft in the colleries near Whitehaven, a strong flow of natural gas was encountered "42 fathoms deep." The gas (then termed "air") was piped to the surface and allowed to escape.

Sir James evidently was more interested in coal than in gas, although he noticed and described very particularly the principal phenomena exhibited by the latter. In his paper he states:—

"*The air will fill a large bladder in a few seconds, by placing a funnel at the top of the tube, with the small end of it put into the neck of the bladder, and kept close with one's hand.*"

"*The said air being put into a bladder, as is above described, and tied close, may be carried away, and kept some days, and being afterwards pressed gently through a small pipe into the flame of a candle, will take fire, and burn at the end of the pipe as long as the bladder is gently pressed to feed the flame, and when taken from the candle, after it is so lighted, it will continue burning till there is no more air left in the bladder to supply the flame. This succeeded before the Royal Society, after the air had been confined in the bladder for near a month.*"

After a lapse of somewhat more than sixty years, the portable idea occurred to William Murdoch, the "Father of Gas Lighting." Shortly after he had demonstrated the practibility of manufacturing and using illuminating gas by building a plant and lighting the Soho Engine Works in 1798, we learn that he "astonished his neighbors" by carrying gas in a portable bladder, and burning it at night to light the way to and from the Works which were at a considerable distance from his residence.

It is recorded that Samuel Clegg (inventor of the first gas meter) in 1811 compressed coal gas in copper globes which were used as portable lamps at Stoneyhurst College.

In 1819, David Gordon and Edward Heard obtained a patent for compressing gas into strong copper or other vessels, fitted with peculiar valves, ingeniously constructed so as to regulate the emission. Into these vessels, it is stated, the gas was compressed so that thirty cubic feet occupied the space of one cubic foot only. Sometimes, in the operations, the pressure was continued to such a degree that the gas was resolved into a liquid state; and it was in the liquid from one of these reservoirs that Faraday discovered benzole.

This patent led to the formation of the "London Portable Gas Company," which commenced its operations in Clerkenwell. From their Works vessels of an average capacity of about two cubic feet, containing the compressed gas were carried to the premises of their consumers; in some cases it was burned direct from the reservoirs, which were rendered ornamental for the purpose; in others, connection was made with the gas and the fittings. The operations of this company gave rise to other similar establishments in England, and subsequently on the Continent.

Following the example of the London Portable Gas Company, compressed gas was introduced into Paris; but after some years of profitless operations, the system was abandoned, and uncompressed gas substituted. For this purpose small gasholders were placed in the consumer's premises, each having a pipe on which was a tap and union joint in communication with the street. The gas was conveyed from the Works by a van fitted up as a dry gasholder, and on this being connected with the pipe of the consumer's holder, the gas was expelled therein. The extraordinary expense attending these operations may be conceived when it is stated that each van contained only about 300 or 400 cubic feet of gas; and in some instances a journey of ten miles with horse, van, and attendant was made to deliver that small quantity; and, to supply a minor theatre for the night, five or six vans of gas were necessary. It is not, therefore, surprising that the concern was not remunerative.

Another means of employing portable gas, also introduced like the former into several large Continental towns, was to have a vessel similar to Gordan's, but of much larger capacity, placed in the premises of the consumer; another vessel, containing the compressed gas, was conveyed there, when the two vessels were connected and left until the pressure therein became equalized; of all the methods of applying portable gas, this was the most unprofitable.

Cast-Steel Poles

Electric Railway Journal, July 30, 1910.

The Butte (Mont.) Electric Company has installed cast-steel poles, having a cross-section in the form of a cross. These poles can be made hollow by coring out the center from end to end and putting into the arms of the cross the metal which is thus saved. The hole could be so cored that the four disunited sections of the castings would be regularly connected every 15 or 18 inches, the connections forming steps for climbing the poles. A 28-foot pole weighs 900 lbs.; a 30-foot pole, 1,100 lbs.; a 33-foot pole, 1,200 lbs. These weights include the cross arms, lugs and other fittings. The principal advantages are the practical indestructibility of cast steel, possibility of straightening in case of accidental bending, and of welding in the case of breaking.

To the Employees,
Pacific Gas and Electric Company,
San Francisco Gas and Electric Company.

I beg to introduce myself to your kind attention as mail boy in the main office, San Francisco. I am a contestant of record for one of the valuable prizes offered by the San Francisco Examiner, which contest closes July 4th, 1911.

In the San Francisco Daily and Sunday Examiners, a coupon is being run in each paper, such coupons counting for one vote if sent in within the prescribed time printed thereon.

Three	months'	subscription	counts	for	300 votes
Six	"	"	"	"	750 "
One year's		"	"	"	1,500 "
Five	"	"	"	"	12,000 "

I beg to respectfully request that if you are not already committed to save these coupons, or contemplate subscribing to the paper, that you forward coupons or notify me at Room 304, 445 Sutter Street.

Very respectfully yours,

John Callaghan,
Mail Boy.

Women of the Company

IN considering the thousands of articles that have been written from time immemorial, both historical and statistical, depicting numerous heroic acts performed during ancient wars and in modern times; in saving lives during great catastrophes and cataclysms, on land and water, man has been strongly featured, and stands out preeminent as the hero. Little has been said relative to the courageousness of women; perhaps due to the fact that woman is not given credit for the many brave acts which she has also performed, notwithstanding that she is by nature, and in comparison with man, greatly handicapped from a physical standpoint, and due to her natural timidity. When, however, a woman does perform a deed of bravery, showing special courage, she really deserves a great deal more credit than when the same act is accomplished by man.

Among the many unchronicled acts of courage, during the great calamity which visited San Francisco during 1906, and one which is of particular interest to the readers of this magazine, was that of Miss Flora M. Austin, who was at the time on duty as telephone operative in the old Post Street office of the San Francisco Gas and Electric Company.

When the first severe shock was felt throughout the city at five o'clock in the morning, and when almost the entire populace was still wrapped in slumber, Miss Austin was at her desk in the telephone room. She was violently thrown from her chair, resumed her position at the board, and was again thrown to the floor, and barely missed being injured by a large electric fan that was hanging from the wall and dropped directly into the place where she had just been seated. The telephone switchboard "went dead," and she was unable to call for help. It must be assumed that the natural inclination under such harrowing conditions would have been to flee into the open street, which at that time appeared to be the only place of comparative safety. Her presence of mind, however, was remarkable, as she notified the inspector on duty in the building to shut off the gas, and then realizing the danger due to the continual earthquake shocks, made her way through damaged offices and fallen walls to the front door. The lower part of the city at that time was in flames, and in spite of these exciting and dangerous conditions, the matter of duty being paramount in her mind, she retraced her steps to the telephone operatives' room, and again tried to secure relief and assistance.

Relief was not obtainable, but she remained at her position until 8: 30 A. M., while the city was in a mad turmoil of fright and wonder, until one of her superiors appeared and informed her that the telephone system of the city was wrecked, that the wholesale section of the city was burning, and forced her to go home.

Miss Austin and her people were among the few fortunates to save their home, and three weeks later she was sent for, when the Company had installed a temporary office in Haight and Fillmore Streets, and has been with the Company ever since.

Miss Austin has recently been advanced to the day shift on the main switchboard of the Company.

This article is not intended as a compliment or mark of appreciation to Miss Austin, whose modesty has heretofore prevented the reciting of these facts, as her own consciousness that she performed only her duty, well and faithfully, is her best reward.

R. J. CANTRELL.

Clark's Hair Cut

Have you seen Clark's latest hair cut?
It will make him known to fame.
It's the swellest thing in Gasville,
Puts all other cuts to shame.

Says Clark unto his better half:
"My hair has too much wave,"
His wife said: "I will cut it,
And the '35' we'll save."

Then she got an agate saucepan,
Placed it firmly on Clark's head,
And she clipped around the edges,
Said: "This ought to knock 'em dead."

The operation ended, ,
Clark gazed into the glass,
Said he: "It looks just like a wig,
But it surely is the 'class'."

The 'Marcelle Wave,' the 'Pompadour,'
Can be worn by any 'Mutt,'
But believe me they had nothing on
Clark's latest 'Sauce Pan Cut.'

When Clark went home that evening,
Said he: "Wife, I'm feeling punk,'
They 'joshed' me to a 'frazzle,'
Your hair cut is the 'bunk.'

She answered: "Let me tell you,
No barber can compare
With a wife who is determined,
To cut her husband's hair."

"And furthermore don't worry,
I wouldn't get so hot,"
And on his 'nut' she gently jammed
A brand new coffee pot.

Then she did some more shearing,
Put some more hair to rout,
One part she skipped entirely,
Where the handle it stuck out.

Now Clark is sorry that he kicked, ,
For he only got in deeper,
He looks as though he got mixed up
With an up-to-date street sweeper.

Eugene A. Beauce.

Haver's New Hat

Have you seen Haver's hat?
It is a scream they say,
And how he looks in it:
I'll tell you right away.

It is a soft creation,
Of the lightest shade of brown,
With a narrow brim around it,
And four dents in the crown.

Huland says a sky-piece,
Of that creamy hue,
Is the "lid" a gambler
Wears when he skins you.

Wentz says Haver looks,
Like Buffalo Bill Cody,
Moon says he's a real bad man,
Who just arrived from Bodie.

Murphy says: "That turban
Takes away my breath,
If it had a feather in it,
It would tickle you to death.

Fitzgerald stopped "green inking,"
And then was heard to say:
"A hat like that is always worn
By the villain in a play."

Donovan says: "My Goodness!
What do I behold?
That 'Chapeau' makes my Haver look
Like a Cow Boy bold."

Collins says: That beano,
Shaped just like a can,
Makes Haver look exactly
Like a bunco man."

Wrinkle says: "I'm peaceful,
Don't want to cut up rough,
But it seems that bonnet,
Makes him look a wee-bit tough.

Says Haver: "Stop your 'Joshing,'
You 'Geezers' make me smile,
I wear this head-gear just because,
It's the latest Oakland style."

Eugene A. Beauce.

See Notice to Employees, page 35.

PERSONALS

To show that our monthly magazine has its moral effect on at least some of our employees, in response to the timely suggestion offered in tribute to our genial Superintendent of Supplies, Geo. C. Robb, in our May issue, our Auditor, Jos. C. Love, brought in and presented to Mr. Robb a large bouquet of choice roses; thus starting the perfume of kindness on his path while he is yet of this life.

Mr. Robb says *Next!*

Manager Florence Wins Deserved Promotion

Gas Company Official Will Be Transferred to Redwood City

From the *Fresno Herald*, June 3, 1911.

It is announced that E. W. Florence, manager of the Pacific Gas and Electric Company in this city, will be transferred to Redwood City and that his place here will be filled by W. M. Henderson, manager of the Colusa office. At Redwood City Mr. Florence will have charge of nine branch offices. The promotions are effective at once, Mr. Henderson arriving in Fresno June 15th.

During the two years Mr. Florence has been in Fresno as manager, he has done much to improve and promote the company's interest. He has just completed a seven and a half mile underground loop at a cost of $35,000, having previously spent $12,000 in re-laying the north end of town with the high-pressure system. New mains have also been laid in a number of the new additions of the city, including the Wilson Tract, Belmont, North Forthcamp, Woodward and South F Street. The gas works have also been remodeled under Mr. Florence's regime at a cost of $14,000.

Mr. Florence is held in high esteem by his business associates and is exceedingly popular about town. He is recognized as possessing exceptional business ability, and the news of his promotion is hailed with satisfaction. There is general regret that he is leaving Fresno.

In Appreciation

The many letters I have received from the Officers, District Managers, and Division Superintendents of the Pacific Gas and Electric Company, following the announcement to them of my resignation as Traveling Auditor of the Company, prompts me to take this course in acknowledgment and in expressing my sincere appreciation of the many kind words of good cheer expressed therein. It is doubtful if any one engaged in work of this character has ever closed his engagement with more regret than I. My official duties have been conducted without so much as one unpleasant word or experience at any of the Company's offices or plants, and my efforts to assist your Accountants in any way I could have been marked by an appreciation and courtesy never before experienced by me, and, I believe, seldom equaled.

I have been made welcome in your homes, have entered into the close confidence of many of you, have shared many of your pleasures, all of which have afforded me the greatest pleasure.

For your success in every way, I wish you the best that life affords; and I shall reflect upon the organization, of which each of you is an integral part, as one of all but ideal harmony, reflecting alike the best in the man in all that pertains to ability, sincerity, the truth, and the right.

Sincerely yours,

J. M. TAYLOR.

Oxford Hotel, June 1st, 1911.

Mr. Joseph P. Coghlan, the genial Claim Agent of the Company, returned the 2d instant, from a five-weeks' vacation and honeymoon trip, during which time he and his bride traveled through the East.

Born, May 10th, to the wife of I. C. Steele, a daughter, to be known as Miriam Jeanette Steele. Mr. Steele is Inspector and Field Assistant in the Civil and Hydraulic Engineering Department.

A clipping received from Marysville District reports that Mr. Walter Holmes, cashier and accountant in the Marysville office, is very industriously engaged in building a cottage. Holmes is suspected of being in line for membership in the Order of Benedicts.

Higher Education at Deer Creek Power House

Mrs. Bauman, wife of Mr. W. C. Bauman, foreman of the Deer Creek Power House, imparting the day's news to the pet pup of the camp. This pup, although a citizen of the United States and Nevada County in particular, is somewhat of a foreigner, as his father is an English bull and his mother an English pointer. He responds to the title of Septimus, and having been born in the winter time, has a violent appetite for large quantities of nice cold snow.

Notice to Employees

AS you are probably aware, the Company recently issued a Business Album of 274 pages of text and illustrations, with a financial and historical write-up of our properties and the territories served.

These albums were gotten out for advertising purposes and have been distributed throughout the world. We find that we have a surplus on hand of about five hundred copies, and beg to advise that those employees so inclined, can secure a copy of this album at cost, $1.50. Remittances to be made in advance, payable to the Company, and addressed to the Treasurer.

District Managers and Division Superintendents have been supplied with leather-bound copies for office purposes. The copies above mentioned, available for distribution, are an exact duplication, excepting that they are bound in heavy board.

Requisitions will be filled in the order in which they are received.

R. J. CANTRELL.

QUESTION BOX

Ask questions. Any one of the several thousand men and women in the Pacific Gas and Electric Company who wishes information pertaining to any phase of the company's work or concerning matters of common interest to residents of any section reached by the company's lines is urged to use this department freely. Send your questions to the magazine. There will be no charge.

Question.—How many inches of water pressure equal one pound per square inch?

Answer.—The weight of a column of water 27.77 inches high equals one pound per square inch.

W. R. M.

Question.—How long will iron pipes last underground?

Answer.—Wrought iron from one to ten years, depending upon the nature of the soil. Cast iron indefinitely in dry sand. W. R. M.

Question.—When and where was gas first used in the United States?

Answer.—In Newport, Rhode Island. In the year 1806, David Melville built a small plant and lighted his house and the street in front of his premises. The first commercial enterprise in the United States was started in Baltimore, Maryland, in 1821. W. R. M.

Question.—What effect does elevation have upon gas pressure?

Answer.—The increase of presure due to elevation is about one-tenth of an inch of water for each fifteen feet. W. R. M.

Question.—Is it true that water would boil under a less temperature on the top of Mt. Tamalpais than at the sea level. Z.

Answer.—Yes; the reason for that is, that at the sea-level the barometer registers 30° of mercury, or corresponding to the atmospheric pressure of 14.70 pounds per square inch, while on the top of Tamalpais the barometer reading is normally 27° of mercury, which corresponds to an atmospheric pressure of 13 pounds per square inch. Thus, since the altitude is increased above the sea-level the pressure decreases, and in the above instance while water boils at the sea level at 212° Fahr., it requires but 207° Fahr. to reach the boiling point of water on Tamalpais.

Question.—What is the temperature of the steam delivered to the steam turbines now installed on the company's auxiliary steam plants? Y.

Answer.—The temperature of the wet or saturated steam as generated at the boiler when using 200 pounds pressure per square inch is 387° Fahrenheit; thence adding 100° to the above for the increased temperature due to passing the steam through a superheater, a tubular device located in the furnace of the boiler, a total temperature of 487° is obtained for the dry or superheated steam as it is delivered to the turbines.

Question.—What is understood by the term "Quality of Steam" that is so commonly expressed in steam plant installations? X.

Answer.—The "quality of steam" represents the percentage weight of the steam, in a mixture of water and steam. For instance, if for each one hundred pounds of mixture there is one-fourth pound of water, the quality of steam would be 99.75. J. P. B.

Question.—Why is a high vacuum more essential to good economy in the operation of a steam turbine than in a steam engine?

Answer.—When operating a steam engine with high vacuum extremely large low-pressure cylinders are required, hence heavy reciprocating parts, resulting in excessive losses in friction, etc. In a turbine the buckets can be made larger without increasing these losses, thus, whereas the efficiency of the engine is only slightly increased and at a critical point there is no further increase, the efficiency of the turbine is increased with every fraction of an inch added to the vacuum.—H. L. LINCOLN, *in Edison Round Table*, June, 1911.

PACIFIC GAS AND ELECTRIC COMPANY

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Sherwood Grover	Asst. Engr. Gas Department
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Colusa	W. M. Henderson
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Fresno	E. W. Florence
Grass Valley	John Werry
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Marysville	J. E. Poingdestre
Napa	O. E. Clark
Nevada City	John Werry
Newman	W. A. Widenmann
Oakland	F. A. Leach, Jr.
Petaluma	H. Weber
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San Rafael	W. H. Foster
Santa Rosa	M. O. Hall
Vallejo	A. J. Stephens
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Nevada (Nevada City)	George Scarfe
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Standard (Electra)	W. E. Eskew
Stockton (Stockton)	J. W. Hall

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Nevada	George Scarfe
North Tower	C. D. Clark
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Sacramento	J. O. Tobey
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Stockton	E. C. Monahan
Solano	J. W. Coons, Acting

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San Jose	R. H. Hargreaves

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Oakland	George Kirk
San Francisco	W. R. Morgan

THE PACIFIC GAS AND ELECTRIC COMPANY

SUPPLIES HEAT, LIGHT AND POWER TO

Place.	Population.
Agua Caliente	50
*Alameda	23,383
**Albany	800
‡Alta	200
Alto	30
Alvarado	200
Allegheny	200
Amador	200
Angels Camp	3,200
Antioch	3,000
‡Auburn	2,376
Baden	1,500
Barber	200
**Belmont	600
Belvedere	481
Benicia	3,360
Ben Lomond	800
**Berkeley	40,434
Bethany	200
Big Oak Flat	150
Bigga	750
Black Diamond	500
Bohemian Grove	25
Brentwood	200
Brighton	100
Broderick	500
‡Brown's Valley	50
**Burlingame	5,000
Byron	200
Campbell	1,000
Camp Meeker	200
Cement	1,500
Centerville	500
‡Centerville	20
**Chico	13,000
Chittenden	50
**Colusa	1,582
‡Colfax	400
Colma	500
Concord	1,500
Cordelia	150
Corte Madera	350
Cordova	25
Cornwall	300
Crockett	2,500
Crow's Landing	375
Davenport	1,000
Davis	750
Decoto	350
‡Dixon	1,000
Dobbins	50
Drytown	100
Duncan Mills	150
Durham	500
‡Dutch Flat	400
Eagle Nest	50
‡East Auburn	1,500
**Easton	500
**East San Jose	1,500
Eckley	20
Eldridge	1,000
‡Electra	50
Elmira	150
El Verano	100
Emerald	50
**Emeryville	2,000
Encinal	20
Fairfax	250
Fairfield	800
**Fair Oaks	250
Folsom	1,500
Forestville	100
*Fresno	24,892
Gilroy	2,000
Glen Ellen	500
Gold Run	100
Grafton	350
†Grass Valley	4,520
Gridley	1,800
Groveland	50
Guerneville	500
Hammonton	500
**Hayward	4,000
Hollister	3,000
Ignacio	50
Ione	900
Irvington	1,000
Jackson	2,035
Jackson Gate	50
Kennedy Flat	50
Kentfield	200
Knight's Landing	350
Larkspur	594
Lawrence	100
‡Lincoln	1,402
‡Live Oak	200
Livingston	200
Livermore	2,250
‡Loomis	150
Los Altos	200
Los Gatos	3,000
Manlove	50
Mare Island	500
Martell	25
Martinez	5,000
**Marysville	5,430
Mayfield	1,500
Mayhew	50
**Menlo Park	1,500
Meridian	300
Middle River	75
Mill's College	150
**Milbrae	300
Mills	350
Mill Valley	2,551
Mission San Jose	500
Mokelumne Hill	150
Monte Rio	50
Mountain View	2,500
**Napa	5,791
Napa Junction	250
†Nevada City	2,689
Newark	700
†Newcastle	600
New Chicago	25
Newman	1,000
Niles	800
Novato	250
**Oakland	225,000
**Oak Park	8,000
Occidental	400
Ophir	50
Oroville	2,500
Orwood	50
Oswald	25
Pacheco	200
**Palo Alto	6,000
Patterson	100
**Penon Blanco	25
†Penryn	250
Perkins	200
**Petaluma	5,880
Peyton	250
**Piedmont	2,000
Pike City	200
Pinole	1,500
Pleasanton	2,000
Port Costa	600
**Redwood City	3,500
**Richmond	6,802
Rio Vista	884
†Rocklin	1,026
Rodeo	100
‡Roseville	2,608
Ross	556
Reutier	30
***Sacramento	52,000
San Andreas	200
San Anselmo	1,531
San Bruno	1,500
San Carlos	100
**San Francisco	416,912
**San Jose	40,000
San Juan	150
**San Leandro	4,000
San Lorenzo	100
**San Mateo	7,000
San Pablo	1,000
**San Quentin Prison	1,600
**San Rafael	5,934
Santa Clara	8,000
Santa Cruz	11,146
**Santa Rosa	7,817
Saratoga	200
Sargent	50
Sausalito	2,383
Sebastopol	1,233
Selby	100
Smartsville	300
Sonoma	1,200
So. San Francisco	2,500
Stanford University	2,000
Stege	100
†Stockton	23,253
Suisun	1,200
Sunnyvale	2,000
Sutter Creek	2,000
Telton	300
Terminus	50
Tiburon	100
Termey	150
†Towle	200
Tracy	1,200
Vacaville	1,177
**Vallejo	11,340
Vallejo Junction	10
Vernalis	50
Vineburg	200
Walnut Creek	850
Warm Springs	200
Watsonville	4,446
Wheatland	1,400
Winters	1,200
**Woodland	8,187
Yolo	350
**Yuba City	1,160

*—Gas	48,275
**—Gas and Electricity	838,844
‡—Electricity and Water	35,685
***—Gas, Elec. and Street Car Service	52,000
†—Electricity, Gas and Water	7,209
Unmarked—Electricity only	127,428
	1,109,441

Service Furnished.	Number of Towns.	Total Population.
Electricity	204	1,061,166
Gas	52	946,328
Water	20	42,894
Street Car	1	52,000

EMPLOYS 3,500 people
OPERATES 11 hydro-electric plants in the mountains
3 steam-driven electric plants in big cities
18 gas works

SERVES ⅖ of California's population
30 of California's 56 counties
An area of 37,950 square miles
¾ the size of New York state
½ the size of all the New England states combined

PACIFIC GAS AND ELECTRIC MAGAZINE

Published Monthly by
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO

VOL. 3 JULY, 1911 NO. 2

CENTERVILLE POWER HOUSE, BUTTE COUNTY

ASSOCIATED OIL COMPANY

GENERAL OFFICE
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San Francisco

Telephone Kearny 4800

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Pacific Gas and Electric Magazine

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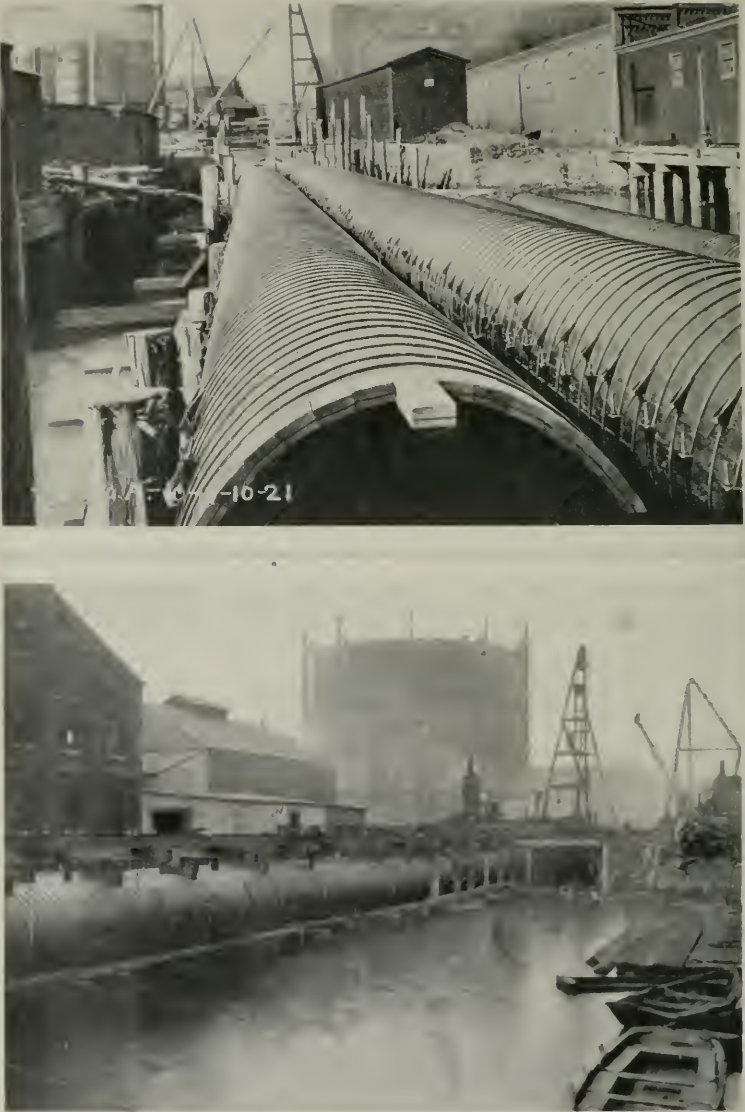


CONSTRUCTION OF SIXTY-INCH INTAKE PIPES AT STATION "A", SAN FRANCISCO

PACIFIC GAS AND ELECTRIC MAGAZINE

VOL. III JULY, 1911 No. 2

The Salt Water System at Station "A" San Francisco

By THOS. E. FOGALSANG, Electrical Supt. at Station "A" and Martin Power House.

T. E. Fogalsang

Some years ago, when the San Francisco Gas and Electric Company acquired the property of the Independent Light and Power Company in the Potrero, they found themselves in possession of a salt water pumping plant that had been heralded as the best around the bay.

The engineers of the old company had long battled with salt water troubles at low tide periods, in connection with the operation of the Townsend and Jessie Street stations, and it was only natural that they should approach the new proposition with some feelings of relief, as it was presumed that with a plant so recently constructed and in such a locality and position on the bay, that surely no troubles were to result in future from a scarcity of water for condensing purposes.

At that time, the plant consisted of one five hundred, and four fifteen hundred kilowatt McIntosh and Seymour compound engines, and two one hundred kilowatt exciter sets, run condensing, but arranged for high pressure work if necessary.

How often is the old adage found to be only too true, that "man proposes but God disposes." Imagine the surprise of those engineers when the first low tides came along, and they arrived at the station to find the engines belching forth great volumes of steam into the adjacent yard. Investigation opened their eyes to the fact that this new and highly "touted," up-to-date plant was simply playing an old trick on them, and that their hopes for a station without salt water troubles was still a dream.

The pumping apparatus consisted of three Jackson centrifugal pumps, direct connected to General Electric induction motors of seventy-five horsepower each, the combined capacity being twenty-four thousand gallons a minute. These were housed in a low galvanized iron building. The water was led from the bay through a rock-ribbed intake to the suctions. Delivery was made to the condensers through a thirty-inch pipe line, but all the water that flowed in through this intake was not at the disposal of the electric station. Originally this intake was built for the use of the Sugar Refinery that stands close by, and they used thousands of gallons in connection with their work.

When the gas company decided that the Potrero would be their main generating station they shut down the steam engine at Townsend Street and moved two fifteen hundred kilowatt sets to the Potrero, and in addition set up two more units of thirty-five hundred kilowatts capacity each. These four last sets had Union Iron Works triple expansion engines connected to run condensing only. This made another large demand on the salt water system, and to meet it a new Jackson pump was installed, direct connected to a 400-kilowatt Rotary Converter, that was taken out of one of the Independent substations downtown. It was soon found that with the Rotary Converter features attached, it did not fill the bill satisfactorily as a motor. Whenever a heavy short came on the system, or an operative made a "bad short" when synchronizing, the machine "stopped over" on the direct current side and burned up the brush and holders. To overcome this, the field which was wound for 550 volts, was split up into four sections, connected in multiple, and a line run from the station exciter bus, for separate excitation. The machine was then operated as a simple synchronous motor, with excellent results.

The capacity of the pumping staion was thus doubled, but at times of low tide there was still a scarcity of water, while to make matters worse, large quantities of mud and debris were drawn up by the pumps and landed in the condenser tubes, choking them up. The intake had to be dredged each year which meant the expenditure of thousands of dollars. But even with that it was "nip and tuck" to get through the holiday season of lighting without running all the compound engines to the atmosphere.

Last year when it was decided that Station "A" was to have a 12,000-kilowatt turbine, the salt water problem was one of the most difficult that the Department of Operation and Maintenance of Steam Plants had to deal with. It is due to the foresight of the Engineer of that department and experience gained through many trying sieges with low tide periods, that Station "A" has today a salt water system that ranks with the best on the bay, and the company is to be commended for providing a system that, to say the least, is a money-saver over the old, as well as being a keeper of gray hairs from the heads of the operating forces. It has been told, and is a fact, that not one of the Chiefs of Staff has ever spent a Christmas Eve or Night at home since the station was started.

Suction Basin as it was

The new pump equipment connected with the turbine installation, consists of a double suction, outboard bearing Jackson pump, with a capacity of 25,000 gallons a minute. It is direct connected to a 400-horsepower 500-volt General Electric induction motor, provided with a switchboard. Two new banks of General Electric transformers aggregating 1,200 kilowatts, and stepping down from 11,000 to 250, 375 and 500 volts, have been installed. Each bank has its own switch panel, the entire equipment being modern in every respect. A new sixty-inch pipe line carries the water to the condensers, while another line the same size, carries the used water back to the bay again.

Instead of using the old intake, it was dredged out to the proper depth, and two sixty-inch wood stave pipe lines, thoroughly treated and well made, were sunk to the bottom and firmly anchored. This allows a perfect entrance for the water from the outer side of the Sugar Refinery wharf to the pump pit, and is at all times below the line of the lowest tide.

At the wharf two large gates have been installed so that the water can be shut off from the pipes if necessary. The entrance to the pump pits is guarded by two large screen gates or aprons, so that no floating debris can reach the pumps. These screens are so arranged that they can be raised for cleaning. One is always up while the other is in the water. A new and substantial building of iron and steel houses the old as well as the new equipment, and a traveling crane has been provided.

Taken all in all, Station "A" now has a pumping plant that is well adapted to its needs for some time to come. That the system is effective, and the operatives handling it efficient and alert, was demonstrated recently, when, during an interruption to the service caused by a transformer burning out, the current was cut off from the motors and the pumps stopped. Yet, in less than thirty seconds water was again on the line, and during the interval, the vacuum on the turbine condenser dropped but one-half an inch.

Gas Chickens

By H. WEBER, Manager Petaluma District.

PETALUMA, or, as some wag has recently rechristened this thriving city, "Chickaluma," situated in the southern part of the great Sonoma Valley, can well be proud of the world-wide reputation gained through the enormous quantities of poultry and eggs shipped annually throughout the United States, and even to foreign countries. This reputation, however, has not been gained through any special benefits which Providence may have showered upon this ideal location, in the way of an even temperature and healthy climate, but by grit and hard work and up-hill plodding by the pioneers, who first took up the work of raising poultry as a business. Long years of constant, steady experimentation, long hours of careful watching alone have brought the reward which these men are now enjoying. As far back as 1882, we are informed, gas was used as a means of heating incubators and brooders to a uniform and exact temperature necessary in the process of hatching chicks, and bringing them to a point of healthy livelihood, where they could safely be shipped as demands were created for them.

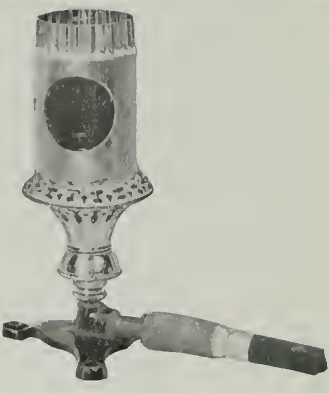
The pioneers in the poultry business in this

district have probably gone through every possible stage, and experimented with almost every known device from the crude method of heating with coal-oil, hot air furnaces and electricity, and have finally come to a realization that the ideal scientific method of furnishing heat for incubators and brooders is gas, and it is now a fact that almost every large hatchery throughout the district, that can possibly secure gas service, is availing itself of this helpful commodity.

Brooder House

We find that in 1902 and during the year 1903 at the California State Fair in Sacramento, chickens were hatched by electricity, and while it is more than probable that electric chicks

Exterior of Hatching House.

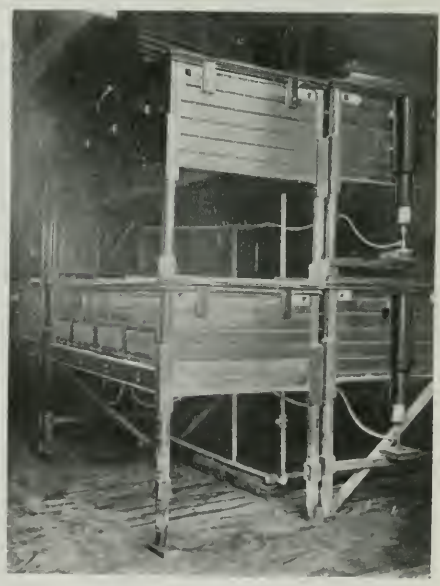


will appear in the future, until that time, however, gas must remain as the helpful hand in the large hatcheries.

The raising of poultry in Petaluma has also created several large manufactories for incubators and brooders, and among these are the Petaluma Incubator Co., the Must Hatch Incubator Co., and several others.

In the year 1902, Mr. A. E. Bourke, proprietor of the Must Hatch Incubator Co., discarded coal-oil and took up gas as a means of heating. Data before us reports that Mr. Bourke, although the inventor and promulgator of many new ideas in the poultry business, was at first confronted with various obstacles in connection with the application of gas for heating purposes in his hatcheries. Success, however, followed his efforts, and many other hatcheries in the vicinity soon fell into line. Some idea can be conceived of the enormous output of chicks from some of these hatcheries by the following statistics:

Last year the combined hatcheries had a capacity of 662,400 eggs, and turned out 662,400 chicks per month. During the month of March, 1911, 1,010,600 cubic feet of gas was sold for incubators and brooders in the Petaluma District. Incubators now range in capacity from 600 to 4,000 eggs. The chicks are



Nest of Incubators Connected for Gas Heating.

shipped when one day old, and consigned to places requiring several days' journey, with perfect safety, and arrive in good condition, without food or water in transit. It is conceded that chicks raised by gas-heated incubators and brooders, where the temperature is regulated uniformly and never over-heated, are stronger and healthier than by any other method.

The shipments of eggs and poultry from Petaluma in 1910 were as follows:

	DOZEN EGGS.	DOZEN POULTRY.
January	416,800	3,570
February	705,305	3,361
March	906,318	4,531
April	995,608	5,136
May	871,428	7,589
June	694,984	10,277
July	521,242	8,151
August	523,940	9,313
September	406,946	8,634
October	384,678	6,245
November	426,640	5,474
December	434,388	3,997
	7,288,215	76,278

This output came from ranches ranging in size from three to twenty acres; ten acres is the general average, and it is safe to raise about 500 chickens to the acre.

Statistics show that a hen will clear from $1.00 to $1.75 per year according to the care given, and the demand has never yet been filled from the output of the Petaluma district.

The following table is a list of large firms, using gas in their hatcheries:

Bihn Hatchery	165,000	egg capacity.
Must Hatch Incubator Co.	140,000	" "
L. W. Clark	60,000	" "
Nisson Brothers	36,000	" "
Jos. Doss	25,000	" "
H. A. George	12,000	" "
Geo. Lasher	50,000	" "
W. Sales	40,000	" "
Western Hatchery	30,000	" "
White Hatchery	50,000	" "
Gable & Company	8,400	" "
Howland & Ayers	12,000	" "
Ed. Gray	10,000	" "
Total	662,400	" "

It is reported that a gas raised chicken should also be cooked on a gas range to secure the best epicurean results.

Forty Miles Conduit Wire

One Company Alone Has 54,000 Feet

When the five companies finish their conduit work in this city Chico will have over 40 miles of wire under ground. The Pacific Gas and Electric Company alone is putting about 20,000 feet of cable in its conduits. Most of this cable contains three wires. The total length of wire being put underground by the one concern is 54,000 feet, or over ten miles.

The Pacific Telephone & Telegraph Company, the Sacramento Valley Power Company, the Postal Telegraph Company and the Western Union Telegraph Company all are observing the terms of the city ordinance calling for the doing away of overhead wires in the business district. While these other companies do not average so many miles of wire as the Pacifice Gas and Electric Company, each one has placed several miles of it in their several conduits, bringing the grand total above the 40-mile mark.

Mr. Van E. Britton has forwarded an item of interest, reporting the consolidation of the Gas Bench Construction Company of St. Louis and the Gas Machinery Company of Cleveland. The new firm name will be the Gas Machinery Company, with main offices in Cleveland, Ohio. This company is equipped to furnish the best qualities of silica and clay materials in both retorts and settings.

Street Lighting Five Hundred Years Ago

By W. R. MORGAN, Superintendent of Gas Distribution, San Francisco.

W. R. Morgan

Five hundred years ago little attention was given to the matter of lighting city streets. The discovery and application of coal gas was not to come for nearly four centuries. About the only sources of artificial light were whale oil lamps and rush candles—and matches were not invented until the year 1805. If a nobleman had to be out after dark, his servants carried torches to light his way through the crooked, poorly paved streets of that period. A common person groped his uncertain way by the light of the stars, or more likely stayed at home to avoid a chance meeting with any of the wandering ruffians and robbers that infested cities during the fifteenth century.

The first attempt to improve these conditions was made during the reign of King Henry V.

In the year 1417, Sir Henry Barton was Mayor of London. He must have been a wide-awake, enterprising man for apparently he was the first to conceive the idea of lighting the public streets at night. Beckman's "History of Inventions" states that he "ordained lanterns with lights to be hanged out on winter evenings between the hours of Hallowtide and Candlemas."

Paris was first lighted in a similar fashion in the year 1524.

In 1668 when some regulations were made for improving the streets of London, the inhabitants were reminded to hang out their lanterns as soon as it was dark.

In 1716, by Act of the Common Council, "All housekeepers whose houses fronted any street, lane or passage were required to hang out every dark night, one or more lights to burn from six to eleven o'clock," and a penalty of one shilling was imposed for failure to comply with this order.

In 1736, the Lord Mayor and Common Council of London applied to Parliament for an Act giving them authority to erect lamps for the purpose of lighting the streets at night. The act must have been passed for we learn that in 1744 "they obtained further powers for lighting the city."

Birmingham was first lighted by street lamps in the year 1733, so in this improvement it preceded London.

During the hundred years following the installation of these primitive lamps the various discoveries of Von Helmont, John Clayton and Dr. Stephen Hales made possible the inventions that within the ten years from 1795 to 1805 gave to the world the science of Gas Illumination.

In 1804 Frederick A. Winsor (the original "promotor" in the gas business) gave lectures and exhibited the new light in the Lyceum Theatre in London. He interested capitalists, built a gas works and laid lead pipes in Pall Mall, and lighted one side of that historic thoroughfare on January 28th, 1807. This is the first instance of the application of gas to street lighting.

As late as 1890, the streets of many small towns in New England (and probably elsewhere) were lighted by coal oil lamps, enclosed in lanterns which were supported by wooden posts set in the sidewalks near the curbs.

Editor's Note

An error was made in our June issue in crediting article, page 13, "The Jubilee Incubator Works," to Mr. J. O. Hansen. This article was written by Mr. L. H. Newbert, Manager of Redwood District.

R. J. C.

A New Consumer—The St. Francis Hotel

By A. R. THOMPSON, General Superintendent Electric Distribution Department, S. F. G. and E. Co.

WHILE it has been our privilege to present to our readers from time to time, items of more or less interest pertaining to the company's business, it is our special privilege at this time to chronicle in the current edition of the magazine, the completion of a contract whereby the company on April 1st took over the load of the St. Francis Hotel, and shut down the private plant here installed.

Aside from the mere fact of the company obtaining this additional business, this matter is of far greater interest to us as showing the possible future status of the central station versus the private plant installation.

The private plant of 825 kilowatts comprising the electric installation of the St. Francis, was installed less than a year ago, and now stands enshrouded in its tarpaulins, a silent reminder, yet a fitting tribute to the superior qualities of reliability and economy of its late victor—the central station plant.

While the St. Francis installation was a modern and up-to-date one in every detail, including apparatus of the highest quality, and embodying the latest engineering ideas—as will be seen by a description of the plant to be hereinafter given—together with the careful and thorough manner in which all material was installed, the hotel management after a thorough and careful consideration of the problem in all its phases, as regards economy, quality and reliability of service, decided to supplant their own service by that of the San Francisco Gas and Electric Company.

In order to take care of this additional business, together with due consideration for absolute continuity of service, the company has already installed two 1,000,000 C. M., 220 volt direct current feeders, and have now in the course of installation an additional 1,500,000 C. M. feeder, which is being run direct from Station C, where the company has installed 5,000 kilowatts in motor generators, and a storage battery of a capacity of 4,000 amperes, from which source you will readily see that there will be absolute continuity of service at all times for our new consumer, the St. Francis, which we are pleased to refer to as one of the largest and most completely equipped hotels in the country.

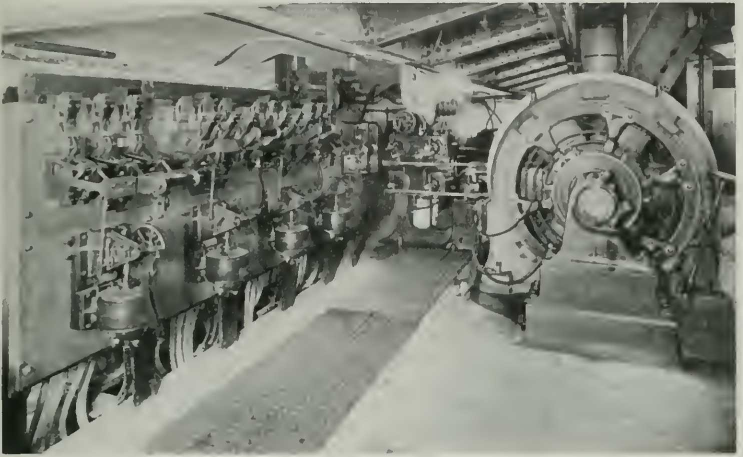
BOILERS.

The boiler equipment comprises three Babcock & Wilcox water-tube boilers, having a combined capacity of 858 horsepower, with two boilers set in one bank and the other singly. The boilers are set on a level about 4 feet below the engine floor to allow sufficient head room. Each boiler is provided with a Little Giant oil burner, California crude oil being used entirely for fuel. Suitable oil and steam supply pipes from pumps in the old boiler room are brought to these burners, all of which are controlled by valves conveniently placed. Steam is maintained at 140 pounds per square inch.

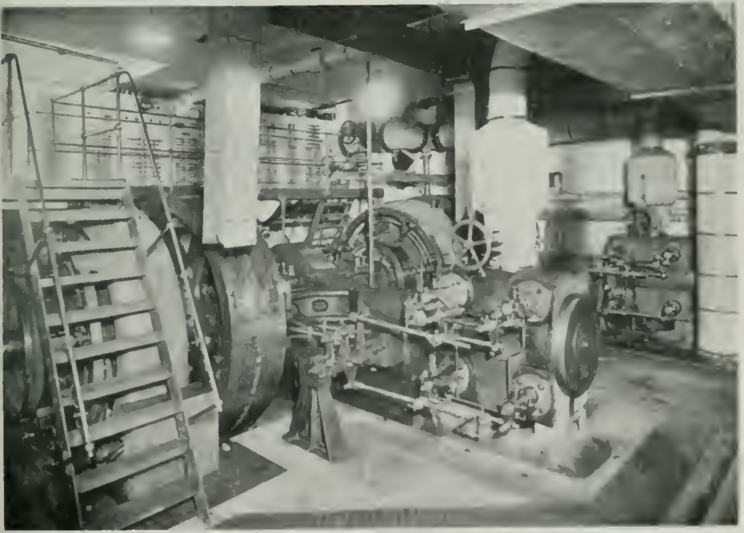
The original boiler equipment consists of four Babcock and Wilcox boilers, each of 83 horsepower, all connected to a common steam header now extended to the new boilers. This gives the plant a total of 1,190 horsepower boiler capacity. These boilers are set in the usual manner and are equipped for burning oil.

Water for these boilers and the new ones as well is pumped from the Cochrane heaters by two 10 x 6 x 10 Snow duplex pumps. The old boiler room in addition contains numerous other pumps, heaters and water filters, to be described later.

Still further to the south there is another room in which are numerous water and



Circuit Breaker Board and 75-kilowatt Units



General View of Engine Room

vacuum pumps, an ice and refrigerating plant, ventilating apparatus, machinery for pneumatic tube system, vacuum cleaning plant and terminal room for telephone exchange.

Oil for the boilers is stored in two tanks, each holding 8,000 gallons. One of these is under the floor of the new engine room and the other under the old boiler room. The entire supply is delivered into the first tank from which it is pumped into the second tank as used. This scheme of handling was devised to overcome the necessity of having tank wagons stop directly in front of the hotel main entrance to deliver oil.

ENGINE AND BOILER VENTILATION.

Since the large tapestry room of the hotel is directly above the new power plant it was necessary to install a special ventilating system to prevent heating this room.

For this purpose there is installed two double-width Union Blower and Engineering Company's 90-inch full housing fans, each direct connected to an 18-horsepower 365-R. P. M. 220-volt commutating pole direct current motor. At this speed these fans deliver 29,400 cubic feet of air per minute, but each motor is provided with a speed regulator allowing the volume to vary according to the demand.

GENERATORS AND ENGINES.

There are four generating units consisting of Harrisburg Fleming simple, non-condensing, four-valve engines direct connected to Western Electric Design "L" engine type generators of three different capacities. Two smaller units are rated at 75 and 150 kilowatts respectively and operate at 225 r. p. m. The two larger sets are each rated at 300 kilowatts at 150 r. p. m. The generators are three-wire compound wound machines designed for 125-250 volts at full load.

In general design and appearance these machines are similar to Western Electric standard two-wire generators of the same type.

The double voltage in these generators results from the use of a special balancing winding on the armature. The coils of this winding lie beneath the usual armature winding and at the bottom of the slot, which is made deeper for this purpose.

The neutral points in the balancing winding are connected to a brass collector ring mounted on the commutator cap from which it is thoroughly insulated.

The brushes for this collector or neutral ring are mounted on an extension of one or more of the regular brush-holder studs, being insulated from them. The brushes are of metallic carbon which wears slowly and gives a good contact of low resistance. The neutral wire is connected to these brushes and the system is operated without external balancing coils or additional apparatus.

The balancing winding is designed for a 25 per cent unbalance; that is, to operate satisfactorily with 25 per cent of the normal full load current flowing in the neutral wire. Under these conditions of unbalance, the difference in voltage between the two sides of the system will not exceed 2 per cent of the total rated voltage of the system.

CIRCUIT BREAKERS.

Each generator is protected by an I-T-E (Cutter Company) motor-operated, laminated circuit breaker, controlled from a suitable panel some distance away. The open and closed positions of the breakers are shown by red and green indicating lamps located at the point of control.

The breakers are of the three-pole automatic overload type, each pole having an independent trip coil, the outside pole coils having a carrying capacity equal to the corresponding generator current, while the middle pole for the neutral lead is designed for 25 per cent of full load current. The outside poles are also equipped with equalizer contacts and all poles, including equalizers, close or open together.

CONTROL PANELS.

As already explained, the breakers are entirely automatic in action and will respond instantly to overload even in the act of closing; hence, the usual hand switch in series with the generator leads is eliminated in this installation. The generators are connected directly to the circuit breakers by rubber insulated lead-covered cables, laid in wooden lined troughs built in the cement foundation. These troughs are arranged to allow any particular cable being withdrawn without disturbing the others in the same trough. One trough is provided for the leads of each generator. The circuit breakers, including equalizer contacts, are connected directly to a single set of bus-bars, allowing any or all generators to be operated in parallel.

Two Model 57 Weston ammeters, with scales of sufficient range to permit of about 50 per cent overload, one pull button control switch with red and green indicating lamps, one Ward Leonard field rheostat and a 6-point potential receptable are provided for each generator circuit. The right hand panel contains an extra 6-point receptable, also a Weston model 9 illuminated dial voltmeter scale 0-300, mounted on a swinging bracket.

DISTRIBUTING MAINS.

From the main bus bars, the current passes through a 3,000-ampere, 250-volt, 3-wire Duncan watt-hour meter, mounted on a panel placed at the right end of the circuit breaker bank. This meter is in turn connected by a set of three bus-bars (one each for the positive, main and neutral leads) to a 3,000-ampere, triple pole, knife switch, mounted almost directly above the watt-hour meter on the distributing board gallery.

Altogether there are 101 feeder switches of various sizes, some two-pole and others three-pole. All lighting circuit switches are double throw with both sets of fuses connected to the same bus. This scheme enables the operator to transfer a circuit to good fuses without delay.

A Bristol recording ammeter and voltmeter is provided for each side of the system on the lighting panels. There is also a voltmeter with necessary potential plugs, enabling the voltage across either outside main and the neutral to be read.

The last power panel contains a Duncan watt-hour meter which records the energy used by the electric range in the men's grill room.

The entire distributing board, excepting the transfer switches was installed several years ago, hence is not part of the new equipment. Leads from the distributing board are run in conduits to various distributing centers throughout the building in accordance with standard practice.

HEATING AND VENTILATING SYSTEM.

In a hotel of this size, which is constantly occupied by from 800 to 1,500 persons, an efficient system of ventilation is essential. For ventilation of the dining rooms, cafe, main lobby and other large public rooms there is installed two 12-foot Sturtevant fans, each direct connected to a slow-speed steam engine. One of these handles the fresh air supply and is equipped with an air washing device for cleaning or purifying the air supplied. This device further tends to keep the air supply cool at all times. A set of steam heating coils is also placed in the discharge duct of this fan, enabling it to supply warm air when necessary.

REFRIGERATING AND VACUUM CLEANING APPARATUS.

The hotel has a complete refrigerating system which includes a Vulcan Iron Works refrigerating machine and a 6 x 4 x 6 Worthington pump which circulates brine for refrigerating purposes in the various cold storage rooms throughout the building. This plant has a capacity of five tons of ice and twenty tons of refrigeration daily. In connection with this equipment, there is provided an ice-shaving and cubing machine, driven by an electric motor for preparing ice used in the buffet, dining rooms, etc.

The vacuum cleaning outfit consists of a steam driven vacuum sweeper having a capacity of eight lines. When operating at 120 r. p. m. this machine develops a vacuum of 14 inches. In conjunction with this sweeper there is an air compressor for blowing out the sweeper lines when they become stopped up in any manner.

ELEVATORS.

Throughout the hotel all elevators are of the hydraulic plunger type. These consist of five passenger, one freight and two service elevators. For operating these elevators there are three 16 x 25 x 18 x 13½ compound duplex hydraulic pumps maintaining a pressure of 140 pounds per square inch.

APPLICATIONS OF ELECTRICITY.

The largest variety of applications of electricity is found in the laundry which is complete in all details and prepared to handle any class of work. Here electricity is used for light, heat, power and communication.

The heaviest of this equipment comprises six washing machines and five extractors or centrifugal wringers, arranged in two rows, and driven from two line shafts operated by a 25-horsepower motor. There are also two driers of the conveyor and sectional type each driven by motors of one horsepower capacity.

Other machines in this department include a sleeve ironer, a band ironer, a collar and cuff machine, a bosom press, two body ironers, a finishing table and two large mangles; the latter driven by individual motors having reversible speed controllers. Some of the other machines mentioned have individual motors and many are driven in groups from a line shaft. The body sleeve and band ironers are also electrically heated. In addition ten electric irons of various sizes and makes are in use.

In the kitchen are two motor-driven dishwashing machines; on the fourteenth floor electric motors operate the silver polishing machines, and the presses in the printing room; in the sewing room there are six machines having individual motors. In the entire building the output of electric motors aggregates about 125 horsepower.

Another interesting application of electricity is found in the men's grill. Here the range is entirely dependent upon electricity. It is divided into two sections used alternately one week at a time. Each section contains numerous small compartments and a large oven. In this range special heating units are not used, Krupp wire being used entirely for this purpose. The wire is wound in spirals and mounted upon porcelain insulators. The various sections are operated at almost a white heat and each section is connected directly across the 236-volt circuit.

TELEPHONES.

Telephones are used extensively throughout the entire building, aggregating about 780 instruments. On the main floor just back of the clerk's desk there is a special six-position Western Electric switchboard. During the hours of heavy traffic five operators and a chief operator are on duty—at other times the number varies according to the demand for service.

A terminal room containing all of the necessary line and trunk relays, protective apparatus, cable connections and other accessories is situated directly under the switchboard on the main basement floor.

The storage battery and its controlling panels are also installed in this room. Two batteries, each consisting of twenty "Chloride Accumulator" cells having a capacity of 120 ampere hours are required for this system—one set being charged while the other is in use. Charging current is taken directly from the main distributing board through a panel containing suitable instruments, charging rheostats and transfer switches. The terminal room apparatus, as well as the switchboard, has an ultimate capacity of 1,200 lines.

PNEUMATIC TUBE SYSTEM.

For the transmission of orders, letters, etc., a pneumatic tube system of the vacuum type has been installed. A blower, required for the operation of this system is placed in the main basement near the ice machine. It is driven by a variable speed motor automatically controlled by a special regulating device which changes the speed according to the amount of vacuum required. Low voltage current for operating the valves at the various tube terminals is furnished by a small motor generator set, placed near the regulating device.

LIGHTING.

For lighting the entire hotel about 10,000 incandescent lamps are used. While a large number are tungsten lamps, there are also numerous tantalum and carbon filament lamps. All types include a large variety of special size and candle-powers.

The exterior lighting of the hotel has been carried out on a large scale and is probably the most beautiful installation of the kind in the West. The entire front outline of the building from the lowest window sills to the roof is strung with electric lights. The system is a permanent one. It consists of weather-proof receptacles placed in condulets joined together by sections of iron conduit, carefully fastened to the exterior of the building. Altogether there are about 2,000 eight-candlepower carbon filament lamps.

This elaborate system of decoration is supplemented by an artistic lighting effect in the form of an electric flag on the roof of the building. The body of the flag is about 14 feet high and 16 feet long. It contains about 400 eight- and sixteen-candlepower carbon lamps grouped in 32 circuits. The color effect is arranged to produce an American flag which is given the appearance of continually waving by means of a large flasher.

From this brief account it will be seen that practically every improvement known to the electrical and mechanical industries have been embodied in this hotel to give the best service and real comfort to its guests.

Comparative Cost of Gas and Electricity

A very interesting tabulation has been received from Mr. F. A. Leach, Jr., Manager of the Oakland District, showing the cost of gas as compared with electricity, as follows:

The average heating value of one cubic foot of gas is about 630 B. T. U.

One watt = .0009477 heat units per second.
One kilo-watt = 1000 × .0009477 = .977 units per second.
One kilo-watt per hour = .9477 × 3600 = 3412 B. T. U.

From 100 cu. ft. of gas may be derived 630 B. T. U. × 100 cu. ft. = 63000 B. T. U. which on the basis of gas rates is worth 9c @ 90c per 1000 cu. ft. This may be compared with 3412 B. T. U. of electricity, which on the basis of company's rates is worth 9c @ 9c per kilowatt-hour.

63000 B. T. U. gas ÷ 3412 B. T. U. electricity — 18.45 which shows the cost of heat by electricity is 18.4 times as expensive as same heat by gas. Electricity at 3c would be 6 times as costly as gas.

A meeting of solicitors and salesmen is held in Oakland every Monday morning, during which time discussions and educational features are entered into by the solicitors and salesmen. The above tabulation was brought out at the last meeting, and we are also indebted to the Oakland District for the following comparative cost of cooking as compiled by Charlotte D. Seaver, and which appeared in the Electric Review, December 22d, 1906:

Electric	1.032	K. W.	at	$ 0.09	$0.0928
Coal	10.5	Lb.	at	14.00	0.0735
Gasoline	.0832	Gal.	at	0.25	0.0208
Kerosene	.078	Gal.	at	0.25	0.0195
Gas	20.	cu. ft.	at	0.90	0.0180

Test for same kind and character of cooking. Period based on one hour.

New Ring Clamp

By HARRY L. ECKEMOTH.

Being the description of an invention by A. G. McArdle, Distribution Dept., S. F. G. & E. Co.

IT was the duty of A. G. McArdle to inspect and keep in order all of the street lighting electroliers in the business district. The chief source of trouble in these electroliers, and this trouble was annoying, constant and repeated, arose from the corrosion of the brass screws or the rusting in of the iron screws that held the large glass globes in place in the caps. When force was applied to the remnants of the screws they would break off and it became necessary to drill them out. This occasioned the loss of much time and was the cause of considerable expense. Very often new holes would have to be drilled, due to the corroded or rusted in screws becoming "frozen" to the metal or by the breaking off of a drill or tap in the work. It was then that McArdle, after numerous experiments, perfected a very simple and inexpensive contrivance which has entirely replaced the screw arrangement, and which he has had patented. The cuts herewith give a clear idea of the simplicity of the change; No. 1 shows the cap where screws are used, and No. 2, the new ring clamp, which consists of a spring wire ring, made of brass, upon which are three movable pins, these pins taking the place of the three screws formerly used. The pins are bored to slide freely on the ring and move easily through holes in the cap, whose diameter is considerably larger than their own; this renders adjustment easy, no matter how unequally the holes may be placed; the whole forming a compact and practical clamp that may be put on, adjusted or removed in an instant. The

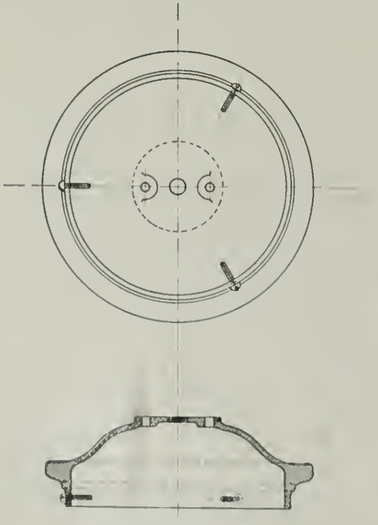


Fig. 1

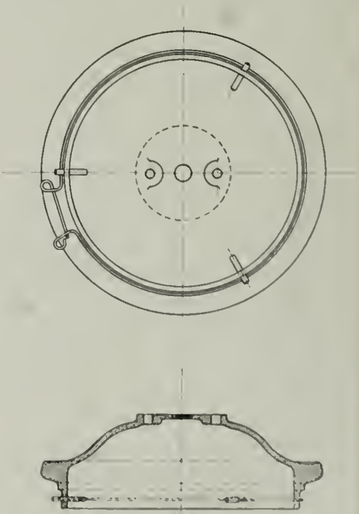


Fig. 2

clamp has been found to not only save the time and expense previously incurred, but many globes that were broken by the removal or the improper adjustment of the screws, in the old form. To be more exact, about twenty-two globes were broken each month for this reason, and since the installation of the ring clamp not a single one has been broken from this cause. There are 1,076 of these clamps now in actual use.

* * *

IN MEMORIAM—N. W. HALSEY

By CYRUS PEIRCE, Manager N. W. Halsey & Co., San Francisco.

N. W. Halsey, head of the banking firm of N. W. Halsey & Co., of New York, Philadelphia, Chicago and San Francisco, died suddenly of heart failure on the first day of July, at the age of fifty-five.

The Pacific Gas and Electric Company has lost a strong friend and an enthusiastic supporter, Mr. Halsey having been heavily interested in the Company from the beginning, and in fact, as a member of the firm of N. W. Harris & Co., was interested in the financing of the old Bay Counties Power Company.

Mr. Halsey was born at Forreston, Illinois, in 1856. He was educated at Beloit and the Union College of Law in Chicago. He practised law until 1885, when he became associated with N. W. Harris & Co., and had been its resident managing partner in New York for ten years until he withdrew in 1901 to form his own firm.

In 1905, Mr. Halsey, in connection with Messrs. Drum, de Sabla and Martin, organized the Pacific Gas and Electric Company, and since that time his firm has been the financial backer of this Company, having handled all of the securities issued by it. Even after the disaster of 1906 and during the dark days of the panic of 1907, his confidence in the future of the Pacific Gas and Electric Company never wavered, and the work that he did in the reorganization of its finances in 1907, during a period when banks were closing their doors and fear reigned in the hearts of investors, is regarded by those familiar with it as having been one of the most remarkable financial feats of recent years.

Mr. Halsey was not only identified with the Pacific Gas and Electric Company, but also with the San Joaquin Light and Power Company, the Pacific Light and Power Company, the Southern California Gas Company, the Electric Properties Company, the Tri-City Railway and Light Company, the Netherlands Tramway Corporation, and a number of other companies.

In Mr. Halsey's death California has lost a strong friend, as he was an enthusiastic believer in this State and its future.

Mechanical Refrigeration

By R. L. WEBB.

REFRIGERATION means cooling, as absorbing heat, which can be done by a the melting of ice. Every substance has three states—gaseous, liquid and solid—and in changing these conditions in the order named, heat is absorbed. Thus cooling a refrigerator by the means of ice, the ice has to melt and each pound melted or changed from a solid state to a liquid absorbs 142 heat units (British Thermal Units, each of which is the amount of heat necessary to raise or lower one pound of water one degree Fahrenheit).

In making ice cream this same method is used. The cream which is to be frozen is surrounded by ice which in melting lowers the temperature of the cream.

Any body in changing from a liquid to a gaseous state absorbs heat in the same manner and a greater number of heat units per pound than it absorbs in changing from solid to liquid. This absorption of heat in changing from a liquid to a gas is the principle used in the mechanical refrigerator. It has been found that some substances are more easily handled than others; namely, atmospheric air, sulphurous acid, carbonic acid, and ammonia. Of these ammonia is used most generally for commercial purposes.

Ammonia at ordinary temperatures is in its natural condition a gas or vapor. At a temperature of thirty degrees below zero, Fahrenheit, at the ordinary pressure of the atmosphere it becomes liquid, as is also the case at higher temperatures, if higher pressure than that of the atmosphere is employed; thus ammonia will remain a liquid only when kept at a temperature of thirty degrees F. below zero. On that scale, and at the usual temperatures, say seventy degrees F. it will be kept a liquid only by maintaining it under a pressure of 115 pounds above atmosphere. With a reduction in pressure the liquid turns to a vapor or gas and in thus changing absorbs heat from the surrounding objects. This absorption is 573 heat units per pound.

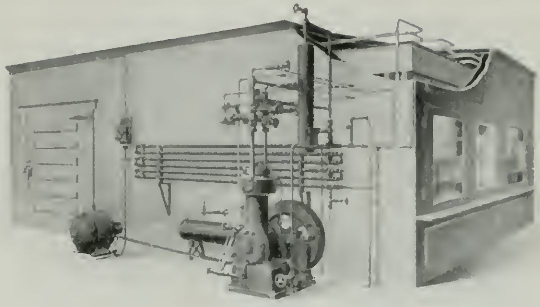
There are a number of methods of using this principal in mechanical refrigeration, but we will first consider the most simple which is in use in the small plants under consideration:

First—THE DIRECT AMMONIA system in which the liquid ammonia under pressure is allowed to expand through what is called an expansion or needle valve, into a series of coils of pipe, which are placed in the box or apartment to be cooled. In this system there is a complete cycle involving three successive steps. They are called: Compression, Condensation and Expansion. These steps are made continuous and are constantly repeated, the ammonia being used over and over and only the unavoidable losses made up.

Second—THE BRINE SYSTEM. In this method the ammonia-expansion coils are submerged in a tank containing a salt solution which is cooled to a low temperature by the expansion of ammonia. The chilled brine is then pumped through circulating coils placed in the boxes or rooms to be cooled. Ice cream can also be made in this way by circulating the cold brine around the cream.

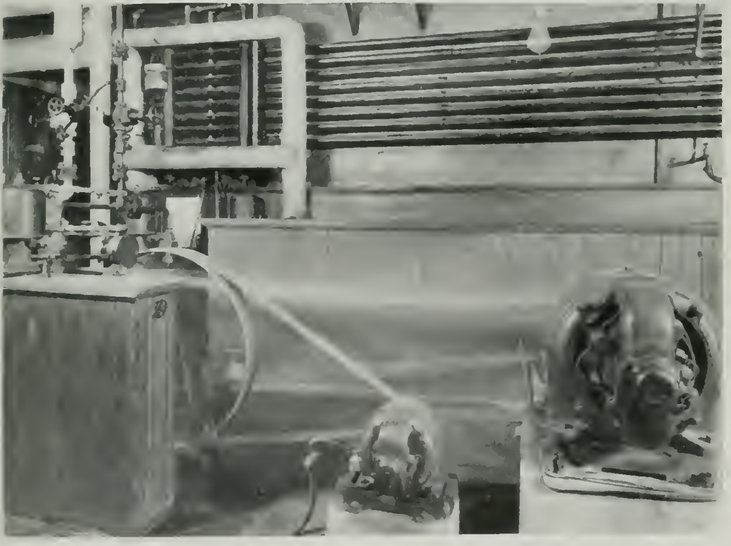
While the direct expansion is to be recommended for its simplicity, the brine method is used where it is desired to operate the compressor only a part of the time. The brine is then cooled low enough to act as a storage so that an even temperature may be maintained over the non-operative hours.

In a later paper it is the intention to go more into the details of these systems, while the purpose of this one is to show the actual saving obtained by mechanical refrigeration over the use of ice. This saving is not alone that of operating, which is less than by the use of ice, but that better results be obtained.



Method of adapting a refrigerating machine to a cold storage box

A certain wholesale provision dealer paid during the month of September $120.00 for ice at $3.00 per ton of 2000 lbs. and could not get his rooms cooler than 44° F. At this temperature meat blackens around the edges which has to be trimmed off, hence a considerable waste, sometimes as great as 10%. By the installation of mechanical refrigeration, using the direct ammonia system, the compressor being operated by an electric motor, the cost for the same month of the next year was only $50.00 for both electricity and water, and a temperature of from 35° to 37° F. was maintained in the rooms,



Refrigeration Plant in basement of Bergez & Franks Poodle Dog Restaurant at 421 Bush Street, San Francisco

Interior of Bergez & Franks Old Poodle Dog Restaurant, showing Refrigerating Coils in Cooler

compressor, kilowatts consumed, the water used and the cost of producing the same effect as by melting a ton of ice which costs in San Francisco and vicinity from $5.00 to $12.00 per ton of 2,000 lbs.

These outfits, which only consist of a suitable compressor and an arrangement of piping with a supply of flowing water, are made as small as to give the effect of melting 200 pounds of ice in 12 hours.

In designing refrigeration plants there are several essentials:

Each plant should be designed by an experienced refrigerating engineer thoroughly familiar with the work that the plant will be required to do. Each part of the outfit must be installed proportionately with its component parts. For instance, in the cooling piping a sufficient quantity must be installed which can only be determined after deciding the size and shape of the room and the insulation of the walls. This and other data will have to be absolutely known before any plant can be properly designed. Each case should be referred to the Industrial Engineering Department, so that the plant may be properly designed by their specialists. These plants require very little attention on the part of the operator, as modern machines are simple in construction. The principle is simple and easy to master.

The first costs of plants cannot be given because the special conditions which exist in each case, such as the proportion of actual ice is needed, the form of the compartments to

at which there was no waste in the meat. Another great advantage of mechanical refrigeration is that a dry cold air is obtained, while with ice the air is moist which produces fungus growth, microbes, etc., and is not as sanitary. Still another advantage is that the temperature of melting ice is only 32° F., hence in rooms that are frequently opened, temperatures below 40° F. cannot be obtained while with mechanical refrigeration any desired temperature is available, and with some products, temperature as low as zero have been found desirable.

The following table gives the ordinary sizes of outfits rated in ice melting capacity in 12 hours; also the size motors required for the

POWER CONSUMPTION PER TON ICE EFFECT IN K. W. H. OF SMALL AMMONIA COMPRESSORS.

Tons capacity of machine.	Size of Compressor.	Revolutions per minute.	H. P. of motor Recommended.	K. W. H. per ton ice effect.	Cost of water per ton ice effect at 30c. per 1000 gals.	Cost of one ton ice effect.	
						at 5c per K.W.H.	at 3c per K.W.H.
¼	3″ x 3″	100	1.0	47.52	.87	$3.25	$2.30
½	3″ x 3″	200	1.5	47.52	.87	3.25	2.30
1	4″ x 4″	170	3.0	35.7	.87	2.66	1.94
2	5″ x 5″	170	5.0	35.7	.87	2.66	1.94
3	6½″ x 6½″	117	7.5	35.7	.87	2.66	1.94
4	6½″ x 6½″	155	10.0	35.7	.87	2.66	1.94

Water consumption based on 2 gallons per minute per ton.
Efficiency of motor at 85% belt loss at 10%.

be cooled as well as the temperature desired. The simplicity of the outfit is shown in the pictures of existing plants installed in this vicinity. In these are shown the cooling coils extending from the bottom to the top of the glass case, no ice is needed, the contents are perfectly dry, no drainage is required and the contents are placed without interference of ice occupying a central position.

In few lines can such a saving be shown as in Mechanical Refrigerating plants, where the operating cost can more than be cut in half, often to one-fourth of the present, and better results be obtained.

Fire Warning

During the year 1910, and in past dry seasons, our properties have been subjected to considerable danger from forest fires in the mountains, crossing our transmission and telephone lines.

One very severe fire during August, 1910, devastated an immense tract in the vicinity of Quaker Hill, between Nevada City and the Deer Creek Power House. Through the combined efforts of the forest reserve and employees in the Nevada Power Division, it was held in check, although we lost one and a half miles of telephone poles and lines.

Another fire occurred adjacent to the Alta-Sacramento line near Gold Run, and which necessitated the calling out of the employees in the Nevada Power Division, Water Division, and help from the railway company.

The following general suggestions should be borne in mind by all who may visit the mountains during the summer season:

1. Never throw away a burnt match until you are sure it is out.

2. Build small campfires. Rake away the leaves and litter from around them. Don't build campfires against standing trees or down logs.

3. Don't build bonfires. The wind may come up at any minute and carry the fire beyond your control. You can tell a good woodsman by the size of his fire.

4. Don't leave a campfire, even for a short time, without putting it OUT with water or dirt.

5. Notify the nearest U. S. Forest Ranger or State Fire Warden of every forest fire you see or hear of.

R. J. C.

The Old Nevada County Electric Power Company

COINCIDENT with the early history of hydro-electric development in the Sierra Nevada Range and particularly in Nevada County, we are incorporating herein, a prospectus issued by the Nevada County Electric Power Co., in October, 1892. This company was incorporated September 22d, 1892, and accompanying same is a reproduction of an old photograph of five of the earliest pioneers in the development of water power on the Pacific Coast.

PROSPECTUS

of the

NEVADA COUNTY ELECTRIC POWER CO.,

Grass Valley, Nevada County, Cal.

Incorporated Sept. 22, 1892.

The Nevada County Electric Power Company was incorporated under the laws of California, on the twenty-second day of September, eighteen hundred and ninety-two.

OBJECT.

The Company is organized for the purpose of utilizing the water power of the South Yuba River by generating electricity and transmitting it to Nevada City and Grass Valley for distribution for Light and Power purposes.

PLACE OF BUSINESS.

The principal place of business will be Grass Valley, Nevada County, California.

OFFICERS.

At a meeting of the stockholders, held October 10, 1892, the Company was regularly organized, and the following officers elected:

President.................Alfonso A. Tregidgo
Vice-President..........Eugene J. De Sabla, Jr.
General Manager and Treasurer............
................Dr. Hulbert H. Clark
Secretary.......................John H. Moss
Attorney.......................Fred Searls

These officers form the Board of Directors.

PROPERTY OF THE COMPANY.

The Company has purchased the following property in T. 17, N. R. 8 E., M. D. M.:

All the mining claims on the South Yuba River, in Sections 23, 24 and 26.

The N. ½ of N. E. ¼ Sec. 24.

All the land East of the South Yuba River in Section 23.

The right of way for a flume and ditch through Section 26.

The Company also owns a water right on the South Yuba River, giving a minimum supply of ten thousand miners' inches of water.

The Company further has secured right of way for their pole lines, and permission to erect poles in both Grass Valley and Nevada City.

PROPOSED PLAN.

The water will be diverted at a point on the N. E. ¼ of Section 24, and carried nearly three miles through a flume to a point in Section 27, thereby gaining a head of 250 feet.

The flume will be designed to carry sufficient water to generate 4,000 H. P. under this pressure.

For the present, machinery to generate 2,000 H. P. will be installed and lines will be built to Nevada City and Grass Valley, for lighting the towns and operating the adjacent mines.

UTILIZATION OF THE POWER.

The distance from the power staion to Nevada City is only three and one-half miles, and almost on the direct line are the Champion, Wyoming, Merrifield, Mountaineer and Providence mines, for the operation of which over 500 H. P. is required.

In the town of Nevada City, 250 H. P. will be required for lighting streets and buildings.

The distance from the power station to Grass Valley is only six and one-half miles.

Within a radius of one mile from the center of Grass Valley, over 1,250 H. P. is required for mines now in operation. Seventy-five per cent of this power is obtained from water, the remainder is steam power.

About 300 H. P. will be required for lighting streets and buildings in Grass Valley.

The N. G. R. R. Co. has applied to this Company for an estimate of cost of erecting Trolley line and furnishing power for the operation of cars be-

A. A. Tregidgo Eugene de Sabla, Jr.
A. M. Hunt E. E. Stark
Jno. Martin

tween Grass Valley and Nevada City, a distance of about six and one-half miles. The central and highest point of this line is scarcely five miles from the power station and the line is practically a continuation of the one running to the mines near Nevada City.

There are at present two petitions before the Board of Supervisors for franchises to construct tramways over the county road between the two towns. Either of these lines will be but four miles in length, and the operating Company will depend upon this Company for power.

PRESENT COST OF POWER.

Power generated by water costs from $100 to $300 per H. P. per annum. When generated by steam it costs $150.00.

Mines, requiring in the aggregate 1,250 H. P. that may be worked profitably with power not costing more than $90 per Horse Power, per annum, are now lying idle.

WORK NOW IN OPERATION.

Immediately after organization the Company commenced erection of the dam on the South Yuba River.

The dam is to be fifty-seven feet long at the bottom and one hundred and fifty-one on top. Its height is to be twenty-seven feet and ten inches.

The remainder of the work will be pushed to a rapid completion.

STOCK, ETC.

The capital stock is $500,000 divided into 100,000 shares, $50 each—all to be fully paid up.

The total investment it is estimated will be about $300,000; and the net income is estimated at $140,000.

The facts that the power exists—the demand for it is at hand—that the distances are small requiring comparatively small expense for copper, together with the permanency of the water power, renders this a most advantageous investment.

First operator to second, who is ambitious to learn, and eventually get on steady at one of the water power plants: "Do you know what a heavy short does at the Rome Power House?"

Second operator: "No. What does it do?"

First operator: "Makes Rome Howl, of course."

T. E. Focalsang.

Pasadena's Municipal Lighting Plant

From *The Los Angeles Graphic*, June 17, 1911.

DELUDED by the specious statements made by the management of the Pasadena municipal electric plant, to the effect that in the year just past, ten per cent was earned on the investment, at a maximum rate of five cents a kilowatt-hour, other cities, arguing from this roseate report, have sought to reduce their contract rate with privately owned electric companies, to a point that will not yield returns sufficient to pay interest on the bonded indebtedness, leaving dividends for stockholders altogether out of the question.

Realizing that such fallacious figures emanating from the Pasadena municipal plant office might work great harm to legitimate interests, if allowed to go unchallenged, since they are obviously inconsistent with known facts, it was decided by a select taxpayers' committee, in justice to all concerned, to employ the services of the most competent, impartial and trustworthy accountants known, to investigate the books of the Pasadena municipal plant, with a view to ascertaining the truth or falsity of the statements disseminated by the management. After considering the relative merits of several reputable firms, the commission was given to Messrs. Price, Waterhouse & Company of New York, Chicago and San Francisco, to conduct the examination.

What the researches of this reputable firm of accountants disclosed makes interesting reading, but before reviewing their findings, it is well to glance at the recent report of General Manager Koiner of the Pasadena municipal plant. From this glowing statement it is revealed that the total earnings for six months, July 1st, 1910, to January 1st, 1911, were $48,079.31, and the expenditures $24,512.35. Charging off $6,243.78 interest on bonds for six months and $4,062.48 allowance for retiring bonds in that same period, leaves an apparent surplus of $13,260.70 to be applied on depreciation or construction—certainly an optimistic showing.

But this is hardly a frank exposition of the facts. With the average monthly total receipts from all sources $8,000—which is in excess of the summary of the department reports—and averaging the monthly expenditures at $4,125, there remains a surplus of $3,875 for each of the six months operated. Now, according to Messrs. Price, Waterhouse & Company, the excess of earnings over expenses from July 1 to October 1 was $13,271.04, but if the municipal lighting department were obliged to account to the taxpayers for full depreciation, interest and ordinary taxes on property investment—all of which must be included by a private company and should be considered in order to arrive at a just comparison—the following items would have to be charged off:

Depreciation, 5½%, 4 months	$ 7,629.62
Interest on Investment:	
4½% on $50,000, 4% on remainder, 4 months	5,844.69
Taxes—Pasadena, State and County, 4 months	1,946.22
Rent of Office, 4 months	300.00
Total	$15,720.53
Deduct excess of earnings as given above	13,271.40
Deficit	$ 2,449.13

But this is not all. Messrs. Price, Waterhouse & Company direct attention to the abnormally small charge for maintenance apportioned by the municipal lighting department, based on comparisons made with a number of private and municipal plants serving a similar sized clientele elsewhere. The Pasadena plant in the last two years has undercharged upward of $7,000 for maintenance on the basis of kilowatt-hours and $11,250 on gross earnings basis. Pursuing this interesting comparison, it is disclosed that while the percentage of maintenance to gross earnings in the companies for the periods named was 15.876 per cent, the Pasadena percentage of maintenance to gross earnings in 1908 and 1910 was placed at 3.2 per cent, so abnormally low as compared with the older and more conservatively conducted plants as to create a reasonable suspicion that a grave error has been made by the Pasadena management in computing this fixed charge.

In privately conducted companies it is the usual practice to make a monthly charge to expenses for the purpose of establishing a casualty fund to take care of possible injuries to employees, but no charge has been made to operating expenses thus far on this account, although there have been two deaths and one serious injury for which the Pasadena municipal plant was responsible. In one case the employee was without relatives, hence the city escaped; in the second instance $500.00 was paid and charged to general fund department of the city accounts, and not to the expense of the department; suit for $25,000 has been filed by the widow, and while no judgment has been rendered against the city there still remains the higher court to be heard from on appeal. The third case is pending.

Another discrepancy is in the matter of insurance. Less than $100 is charged off to boiler insurance, yet in private companies having an investment of $350,000, insurance on $150,000 would be carried at an annual cost of $1,125.

Take the report covering the disconnections. More than 600 were made in the period to October 31st, 1910, by the municipal plant. The meter is removed in each instance, but the connection remains intact, in case the consumer elects to return. On the basis of an average of $10 a connection, there is an idle investment of $6,000, if the customers do not return. Here is a large waste which does not show in the report.

In computing the earnings of the Pasadena lighting department there appears a credit of $33,311.24 for street lighting, which, of course, is charged to the taxpayers. This item represents about 44½ per cent of all earnings. Figured on the basis of 30,000 population, it gives a cost of $1.11 per capita on this account, a percentage considerably higher than other cities on the coast are obligated. Moreover, Pasadena charges a flat rate of 8 cents for its street lamps. As these are tungsten lights and effect a saving of fully 40 per cent as compared with the lamps for which the five-cent rate is made, it will be seen that the price made to taxpayers in respect to street lighting is disingenuous, to use a mild term, and hardly warranted by the conditions. It is understood that the city declined a proposition by which it could have been furnished the street lighting for an equal number of lamps, for $25,000, the conditions being practically the same as at present, for which service $33,311 is credited on the books to earnings. In addition, the private company offered to furnish such other lights that, if installed by the municipal department, would bring the normal charge —or earnings, as this item is termed—to $38,000, a difference of $13,000, which the taxpayers are losing.

Thus far, the plant has cost the taxpayers about $450,000, for which no provision has been made for depreciation. On the basis of 5½ per cent per annum, the rate used by Professor Cory in his report to the mayor and city council, and which is the average rate adopted by electric corporations, the depreciation to date is about $44,000. A surplus existed, according to the books of October 31, 1910, of $52,645, but with the depreciation deducted—which has not been done on the department books—the "earnings" shrink to $8,645. It is true that the monthly reports recognize the need of such a charge by referring to a depreciation account, but thus far the charge has not gone into the books. Now, deduct the cost, as shown by the unused disconnection material of $6,000, and the surplus is reduced to $2,645. If the widow who filed suit for $25,000 for the death of her husband, killed in the service, should succeed in getting an award of $5,000, the surplus at once would become a deficit.

All the above is set forth without prejudice and are the cold, unvarnished facts, which privately conducted companies are bound to consider in establishing a rate that will yield a reasonable return on the investment. There is no desire, in setting forth this review of the Koiner report and of the Price-Waterhouse investigation, to minify the one or magnify the other. The items, as taken from the department books and subjected to the light of comparison with old-established companies in the east, with an aggregation of municipally-conducted lighting departments of similar size, and with fixed policies in the matter of depreciation charges, casualty fund, insurance charges, and the like, reveal discrepancies that it were folly to ignore.

On paper the Pasadena municipal lighting department would seem to have substantiated all claims advanced by its promoters, but the various omissions, as shown, the disingenuous street lighting, "earnings" and waste, together with current liabilities not included in the manager's report, more than wipe out the book surplus.

Messrs. Mercereau, Fogg and Hotaling, the former lighting committee of the Pasadena city council, have recently prepared an article for publication which extols the lighting department because of the low rate to consumers it has established, all the figures quoted being taken, of course, from the books experted by the Price-Waterhouse Company, the discrepancies in which have been duly noted. The committee, naturally, takes a roseate view of the plant and of its work to date, what is given out over the three signatories undoubtedly being written in the best of faith, basing their argument on the book figures with which they have been supplied. They congratulate the taxpayers on the reduction of rates from eight cents to five cents per kilowatt-hour, which latter rate, they assure their constituents, is entirely consistent with good business principles and with the policy of maintaining the plant upon a self-sustaining and self-perpetuating basis. How far they are in error must be left to the disinterested judgment of those who have followed the deductions made in this article, all of which are based on sound business principles, the result of years of economic study and applied expert knowledge.

The Modern Age

In the Golden Haze of the Dear Old Days, there was always Time to spare; to chop your wood and kindle your fire and clean your grates with wifely care. But we've outgrown that, and a five-room flat with modern Gas Appliances, is the home of the modern pair.

No back-logs light on the hearth at night, but a Gas Stove's glittering glare.

C. A. Edgecomb, Fresno District.

Oakland Man's Incubator Blows Up Just as "Cheep" is to Begin

F. O. Spicer of 1470 Thirteenth Avenue, Oakland, has decided not to buck the Petaluma egg and chicken trust.

Just two days before he intended to count his chickens the lamp in his incubator exploded yesterday morning, snuffing out 300 embryo chickens and several dollars of prospective profit.

The explosion also wrecked the shed for the incubator and set fire to the wreckage, which was burning briskly when the fire department arrived.

—*Oakland Examiner* of May 27th.

Biography of H. D. Towle

By JOHN WERRY, Manager Nevada County District.

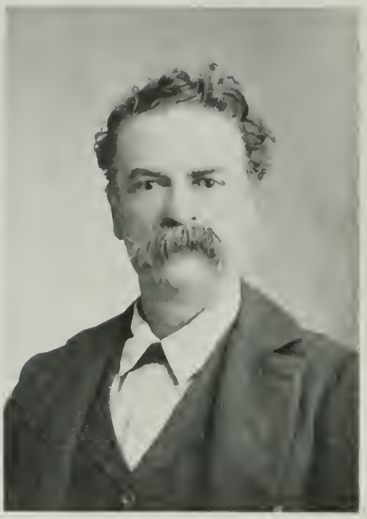
ON April 30th, 1911, a resignation card was passed to the San Francisco office, covering Mr. H. D. Towle, caretaker of reservoirs and canals in the vicinity of Snow Mountain, Nevada County, and which prompted the following biographic sketch of one of the most interesting and oldest employees having to do with the great water systems in the Sierras.

H. D. Towle was born in Windsor County, Vermont, March 22d, 1837, and came to California in 1856, arriving in San Francisco December 9th of that year. He then came to Nevada County and was employed on a ranch near Spencerville for one year and was afterwards employed logging in a lumber camp for five years.

June 2d, 1862, Mr. Towle went to work for the South Yuba Water Company, taking the place occupied by his brother, Ezra Towle, who was transferred to take charge of a mining claim at Buckeye Hill.

In October, 1865, Mr. Towle was married to Miss Jennie F. Ellison. They have three sons, two living in Nevada City and one in San Francisco. He also had a brother, W. W. Towle, who was a ditch agent at Bear Valley for two years.

Mr. Towle served continuously on the lower end of Snow Mountain ditch, usually called the Manzanita, for 48 years and 11 months. During that time he served under the following managers: James Whartenbury, Charles Marsh, J. E. Brown, John Spaulding and George Scarfe. When he was first employed by the company, all water used was for hydraulic mining and for domestic purposes, no water being used for power purposes on his section until 1884.



Mr. Towle is a strictly temperate man, having never used any intoxicating liquor whatever. He is very agreeable, making friends with everyone whom he meets.

Mr. Towle was considered by the former managers as a very valuable agent, being a good flume man, but for a few years past he has been troubled with one of his legs. One of his sons has assisted him some when making any long trips, although he attended to the measuring of all water and looked after the repairs of the ditch.

Mr. Towle has been placed on the pension list of the company.

The General Electric Company reports under date of June 12th, that they have recently invented a new indicating boiler flow meter, which is designed to indicate the total amount of steam generated at any instant by a boiler, or a battery of boilers, in pounds per hour or in boiler horsepower.

Pacific Gas and Electric Magazine

PUBLISHED IN THE INTEREST OF ALL THE EMPLOYEES
OF THE PACIFIC GAS AND ELECTRIC COMPANY

JOHN A. BRITTON - - - - - - - EDITOR
A. F. HOCKENBEAMER - - - BUSINESS MANAGER

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The Pacific Gas and Electric Company desires to serve its patrons in the best possible manner. Any consumer not satisfied with his service will confer a favor upon the management by taking the matter up with the district office.

VOL. III JULY, 1911 No. 2

EDITORIAL

IT IS WITHIN the memory of many readers of this magazine when the streets of the cities of the world were lighted by means of the old-fashioned flat-flame gas burner, of either the fish-tail or bat's-wing type. It requires no stretch of memory for many to remember when coal oil, gasoline and naphtha lamps were also generally used. With the advent of electricity making itself fully felt in about the year 1884, the gas lamps became displaced by the then well-known type of direct-current series-arc lamps having a potential of 50 volts and a current of 9.6 amperes, of the boasted capacity of 2,000 candlepower each, as against the possible illuminosity of the single gas burner previously used, and not to exceed 20 candlepower.

The first installation of arc lamps was placed upon high poles, and for a time the principal method used in many cities was by means of steel towers reaching an altitude in some instances of over 175 feet, and containing at the top four or more arc lamps. These served to illuminate the atmosphere more than they did the ground upon which people traveled, and as the science of electric lighting progressed, these gave way to lower posts. There finally came into use a system of mast arms, as they were called, or bracket projections of different types, placing the lamps about 25 feet from the ground, and thus giving more effective illumination. The direct-current series-arcs exhausted themselves in about fifteen years; then began the introduction of the series-alternating, with probably a less extent of area covered by the rays from the lamp, but having effective economies and a less consumption of energy, and requiring trimming but once every six days as against the old-type arcs requiring trimming every day. Then followed an era of development in ornamental lighting by means of incandescents, first of the carbon filiament type and later of the high efficiency tungsten and lamps of that character. The series-alternating lamps are now giving way to the magnetite, with greater illuminosity and greater effect in actual distribution of light over a given area.

With all of the improvements made in the past twenty-seven years in the method of street lighting, it is noticeable from reports all over the world that the once much-despised gas lamp is again coming into actual use as an effective means of street illumination. The development of the Welsbach mantle has made this a possibility, as has also the recent development of the high-pressure gas arc, and there are possibilities of ornamental lighting by means of gas equal to that of electricity. It is undeniable that the light is softer, whiter and steadier than that of the most perfected arc, and more brilliant in diffusion than the most effective type of filament lamps. The pleasing effect of gas lamps bordering the curb line of the street, the great diffusiveness of the light, the possibility of concentration, the absolute certainty of supply, and, withal, the cheapness, will, it is perfectly safe to surmise, eventually cause gas, as an illuminant for street lighting, to displace electricity. The cost of construction per unit for light is less, the maintenance and depreciation infinitely less, and its effectiveness equal to any installation yet made for electricity. Thus gas, with a record of over one hundred years of active beneficial use to the people of the world, will again come into its own.

Authorized Additions and Improvements

STOCKTON: Purchase of block bounded by Jackson, Clay, Center and El Dorado Streets, for additional wells and water supply.

OAKLAND: To change over oil-gas generators No. 3 for the manufacture of lampblack water gas.

VALLEJO: Completion of a brick generator house and scrubber-room.

SACRAMENTO: Work has been commenced on the extension of a 4,000-volt, 3-phase line, south on Riverside Road.

CHICO: Extension of street main to district known as Chico Vecino.

SACRAMENTO: Property on block bounded by Eleventh to Twelth, K and L Streets, has been purchased, and on which a suitable office building will be erected in the near future.

CHICO: Extension of gas mains in the district known as Chapman Town and Barber.

SACRAMENTO: Work has been commenced on the conversion of old crude-oil gas generator and lampblack water-gas machine.

MARIN: Extension of high-pressure gas mains in the Davidson and Bush Tracts at San Anselmo.

MARYSVILLE POWER DIVISION: Fifteen horsepower pump has been installed for the purpose of demonstrating the use of electricity for irrigation at Meridian.

REDWOOD: Work has been commenced on a 3-phase, 3-wire, 4,000-volt line from Mountain View Substation, on the Alviso Road and San Jose Road, for the purpose of serving additional consumers.

OAKLAND: Extension of street mains in town of Point Richmond, and in the City of Richmond.

ALAMEDA COUNTY: Work has been commenced on a series-multiple street lighting system in the town of Irvington.

ALAMEDA COUNTY: Construction of a series-multiple street lighting system in the Town of Decoto.

SAN FRANCISCO: Work has been commenced on the rebuilding of a primary generator shelf and water-gas sets No. 4 and No. 5, Potrero, San Francisco.

To cover installation of station meters at Potrero Gas Works.

Purchase of automobile for use of Gas Department.

Installation of 8-inch steel gas main on Geary Street from Webster to Central Avenue, and also on Page, Stanyan, Hugo and Irving Streets, from Webster to Ninth Avenue.

Under the name of the Pacific Gas and Electric Company, temporary offices have been opened in the City of Richmond at 709 MacDonald Avenue. Mr. W. E. Luce, who has been for a number of years bookkeeper and collector for the local electric light company under Manager H. B. Kinney, will be resident agent at Richmond.

The Company has been distributing gas in Richmond during the last four or five years in a limited way, conducting all the business from the Oakland office. With the appointment of Mr. Luce as Agent, and the establishment of offices in Richmond, a vigorous campaign is being made for the establishment of an extensive gas system in both the old city known as Point Richmond and the new city to the east.

Appropriations have been made of approximately $20,000 for immediate use in the extension of mains, and before the summer is over, Richmond will have an up-to-date gas system for the supply of its citizens.

Electric Talks

VII—Wire Measurements and Plain Calculations for Same

By JOSEPH P. BALOUN, Head Draftsman.

J. P. Baloun

The more advanced and difficult problems of wiring for use with alternating current when of a polyphase nature are not discussed in the present outline.

In wire measurement a circular mil is the adopted unit that is employed, and it is equal to the square of 1,000 times the diameter of the wrie. Thus a wire .25 inch in diameter has an area or cross section of 62,500 circular mils.

In estimating the size of wire for electrical distributing systems, the density of the current expressed in amperes must not exceed a certain determined or standard valuation when compared to a given cross sectional area of wire. For example, approximately a range of 1,000 to 1,100 amperes of current are used per square inch of area when calculating for large wires or cables, and up to 2,000 amperes per square inch for small wires.

Much excess of current density over these valuations will heat the wire and burn the insulation thereon.

If, as is usually the case, the distance of transmission is so great that the wire is much larger than the current warrants, the diameter or circular mil size is determined by the "drop" in voltage, which is allowable.

An ordinary formula for the size of wire required for either direct or alternating current transmission is

$$A = \frac{2 \times D \times I \times 11}{V}$$

in which

A = area in circular mils.
D = distance of transmission in feet.
I = current in amperes.
V = voltage drop allowable.

With this formula before us the development of the item A will be further explained.

The circular mil is used as the unit of area for the calculation of round wires for electrical purposes, and the square mil is for rectangular section wires. The area of a round wire one mil in diameter is a circular mil; the diameter of this wire can also be expressed as .001 or 1/1000 inch. Hence the square of any diameter expressed in thousandths of an inch will give as a product the number of circular mils that can be placed side by side in a square, the sides of which are equal to the diameter that has been squared, and as in Fig. 1, to an enlarged scale, the combined area of the small circles contained within the square are equal to the area of the large circle, the area of the large circle equals 16 circular mils.

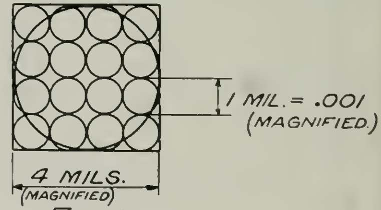

Fig. 1

One circular mil equals .000,000,785 square inch irea. Again, expressing the diameter as a whole number in mils or C. M., as it is conveniently abbreviated, which rule can be written C. M. = D^2, when d = diameter of wire. If on another occasion the circular mil area is known and the diameter is desired, it is simply necessary to extract the square root of the circular mil area, and the result is the diameter expressed in mils, as $D = \sqrt{C.\ M.}$

The drop in voltage is usually taken as a percentage of the pressure generated, from 3 to 10 per cent. If a given amount of power is to be transmitted over a long distance, a high voltage greatly reduces the size and consequent cost of the wire. Supposing 5,000 kilowatts is to be transmitted 50 miles with a 10 per cent loss, and comparing the size of wire for 10,000 volts as against 20,000, the procedure would be as follows: the total current at 10,000 volts would be

$$\frac{5{,}000{,}000 \text{ watts}}{10{,}000 \text{ volts}} = 500 \text{ amperes:}$$

$$\text{Volts drop} = 10\% \times 10{,}000 = 1{,}000 \text{ volts.}$$

$$50 \text{ miles} = 264{,}000 \text{ feet.}$$

$$A = \frac{2 \times 264{,}000 \times 500 \times 11}{1{,}000} = 2{,}904{,}000 \text{ C.M.}$$

The total current at 20,000 volts would be:

$$\frac{5{,}000{,}000 \text{ watts}}{20{,}000 \text{ volts}} = 250 \text{ amperes.}$$

$$\text{Volts drop} = 10\% \times 20{,}000 = 2{,}000 \text{ volts.}$$

$$A = \frac{2 \times 264{,}000 \times 250 \times 11}{2{,}000} = 726{,}000 \text{ C.M.}$$

Thus, doubling the voltage of the line decreases the size of the wire four times, that is, the size of the wire varies inversely as the square of the voltage employed. The importance of using a high voltage transmission is made very apparent by the enormous saving in copper for the conducting medium. Alternating current is therefore necessarily used as it can be easily transformed to a low safe pressure at the end of the transmission line from a dangerously high potential, by means of the familiar static transformer, an electrical detail which will be described later.

The wire gauge known as the B. & S. gauge, named after the Brown and Sharpe Manufacturing Company, and also commonly known as the American Gauge, is the one generally used in this country for the measuring of round wire. The B. W. Gauge (Birmingham Wire Gauge) is the English Standard Gauge. There are many other American and foreign systems of gauges, but their comparative value to the now almost standard B. & S. Gauge, would only lead to confusion at this time. Tables of the B. & S. Gauge can be found in all the leading hand-books or all the important catalogues and text-books on wiring or electrical distribution. It will be noted on looking over one of these tables that the first column expresses the manufacturer's number or gauge; for example, the scale in the B. & S. Gauge is from No. 0000 wire (460 mils diameter; almost $\frac{1}{2}$ inch) to No. 40 (3 mils diameter; or 3-1000 inch), the sizes keep increasing as the gauge numbers decrease.

The diameter, C. M., area, weight, length, and resistance are also as a rule tabulated. A few of the notable features about a B. & S. Wire Gauge table are that a wire which is three times larger than another has half the resistance, twice the weight and twice the area; a wire that is ten times larger than another wire has one-tenth the resistance, ten times the weight, and ten times the area. A No. 10 wire is practically .10 inch in diameter (exactly .102); it has an area of about 10,000 circular mils (exactly 10,380); it has, if of copper, a resistance of one ohm per thousand feet at 68 degrees Fahrenheit, and a weight of nearly 32 pounds (exactly 31.4) per thousand feet.

In comparing an aluminum wire to that of copper, it has only 63% conductivity of the copper if both wires are of equal areas. If both wires are to be of equal conductivity, then the aluminum wire will have 1.6 times the area of the copper wire but only 48% of the weight of the copper wire. Thus from this relation an aluminum wire to be of equal conductivity with a copper wire is almost two sizes larger by the B. & S. Gauge.

Though copper wire is about 1 1/7 times the weight of an iron wire of the same size, it has a fraction over six times the conductivity. A simple means for determining the diameter of a cable for various number of conductors as indicated in Fig. 2 is by the following rules $D = 1.155d\sqrt{N}$. where D = diameter of cable or number of times larger than strands, d = diameter of strand, and N = number of strands. The current carrying capacity of insulated copper cables sheathed with lead, depend first, upon the size, number of and the internal arrangement of the conductors within the lead covering; secondly, upon the nature of insulating material surrounding the conductors and the temperature of the air or medium around the lead covered cable. As the thickness of the insulation is increased, and with a given current flowing, the temperature of the conductor also increases, and therefore the current carrying capacity of the cable is slightly reduced by over-insulation. For example, If the initial temperature of an electrical conductor is 70 degrees Fahrenheit, it can safely be given three times the current carrying capacity of a conductor located in a temperature of twice that amount or 140 degrees Fahrenheit. It must be generally understood that all wires and cables are calculated on the basis of being subjected to an average temperature of 70 degrees Fahrenheit before they are loaded with the electrical current. Any increase over 70% must be compensated for by reducing the current to be carried. Carbon and electrolytic conductors (battery solution) decrease in resistance as the temperature rises, but all metal wires have their resistance increased by an increase of temperature. By measurement it has been found that for copper wire the resistance increases nearly one-quarter of one per cent (.0021) for each degree Fahrenheit temperature rise for each ohm. The hot resistance of the carbonized filament of an incandescent lamp is about one-half the cold resistance.

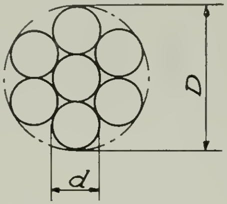

Fig. 2

* * *

James H. Wise

WHO "CAME BACK."

IN the February, 1910, number, an article appeared entitled "James H. Wise, Retiring Civil and Hydraulic Engineer." Many expressions of regret were tendered Mr. Wise at the time he severed his connections with the company, and now that he has returned as of July 1st, 1911, in the capacity of Assistant General Manager, felicitations and a brief resumé of Mr. Wise's travels since he left the company, are in order.

Mr. Wise has, subsequent to February 1st, 1910, acted as Consulting Engineer for this company, from time to time, as demands were made upon him. He spent two months on a trip to Dawson, Yukon Territory, in connection with the 7,000-kilowatt hydro-electric installation for the Granville Mining Co. Work was commenced on this installation while Mr. Wise was in the North; water was diverted from the North Fork of the Klondike, and after leaving the power house was discharged into the main Klondike.

Power was generated for the Canadian Klondike Company, the Yukon Gold Company, and the Granville Mining Company.

It might be of interest to note that current for lighting purposes was sold at Dawson at $.40 per kilowatt-hour. The electricity was furnished by a steam plant which had a very high load factor during the winter time, and practically no load in the summer time, as there is about 20 hours' daylight during the months of June and July.

Investigations were made by Mr. Wise, subsequent to his return from the North, on the Cowlitz River in Washington, on the Tulle River for the San Joaquin Light and Power Company, on the Klamath River for the Siskiyou Light and Power Company, and he also carried on efficiency tests of the Pelton Francis turbine unit at the Borel plant for the Pacific Light and Power Company, and in conjunction with Mr. Baum, Consulting Engineer, San Francisco, he experted for the Monterey County Gas and Electric Company, the water system of Salinas and the transmission and street car systems at Monterey.

Mr. Wise will make his headquarters at 445 Sutter St., and we welcome his return.

Two Bits of Sentiment

By EUGENE A. BEAUCE.

Suggested by the writer's daughters when the latter were two years of age.

"Not Good-By, Just Good-Night"

"Not 'Good-by,' just 'Good-night,' "
Our little Alice said,
As her mother tucked her safe
Within her snow-white bed.

Then Alice drew a weary sigh
That presaged slumber deep,
As fitfully she breathed the prayer,
Now I lay me down to sleep.

"Rest well this night, dear heart,
For angels hover nigh,"
Said mother to her precious one,
Then whispered soft', "Good-by."

"Not 'Good-by,' just 'Good-night,' "
In lisping accents came,
With quiver of the ruby lips,
From the tired little dame.

And thus we trust 'twill ever be,
When life is taking flight,
To say, with hope of Heaven's dawn,
"Not 'Good-by,' just 'Good-night.' "

"Never Mind"

When things go wrong in our house
And Fate appears unkind,
Our baby, 'Gene, with sober mien,
Says quaintly: "Never mind."

If she is naughty now and then,
As babes sometimes you find,
Should you reprove, she drops her eyes,
And murmurs: "Never mind."

One day her best doll she let fall,
The one for which she pined,
She coolly scanned the broken mass,
And said, "Oh! never mind."

Once illness laid the dear one low
With tears our eyes were blind,
She raised her little pain-racked head,
Said faintly: "Never mind."

And so when things don't turn out right,
Bad luck toward you is lined,
Just take a tip from tiny 'Gene,
Say bravely: "Never mind."

PERSONALS

On the evening of June 25th, the San Rafael residence of Mr. Wallace Foster, manager of the Marin District, was entered by a burglar, and a number of pieces of valuable jewelry belonging to Mrs. Foster were stolen. No trace of the missing articles has yet been found, all of which is very regrettable, in view of the fact that some of the jewels had been in the family for a great number of years, and others were presents, and all highly prized.

The stork visited the home of J. O. Hansen, Superintendent of the San Jose Power Division, on June 6th and left the third boy. J. O. is wearing that proud paternal smile for his son promises to live up to the charmed third and surpass the average.

A very interesting address was made by Mr. Geo. C. Holberton, General Manager of the San Francisco Gas and Electric Company, before the Rotary Club of San Francisco, at the weekly luncheon held by the club, in Techau Tavern, at noon, Tuesday, July 11th.

Over fifty interesting lantern-slide views were shown, and explained in detail by Mr. Holberton.

There died on May 2d at St. Luke's Hospital, San Francisco, Mr. Daniel Mack, operative in Station "A," San Francisco.

Mr. Mack had been sick for some time, and passed away as the result of an operation. The funeral was held at South San Francisco, under the auspices of the Masons, Knights of Pythias and Electrical Workers, of which orders he was a member, and interment was made in Mount Olivet Cemetery.

"Dan Mack," as he was known among his associates, was one of the old employees of the Standard Electric Company of California, working under Engineer A. C. Bunker, from the time work was first started at Electra, and remained in the employ of that company until the power house at Electra was in operation. He was transferred from Electra and operated at Martin Station, and for the past five years and up to the time of his death, has been an operative in Station "A."

Mr. A. F. Hockenbeamer, Vice-President and Treasurer of the Company, and family are spending several weeks vacation at Glen Alpine and Tahoe.

W. A. Pennel and family of Woodland have moved to Yuba City to reside. Mr. Pennel is connected with the Pacific Gas and Electric Company with headquarters in Marysville.

—*Marysville Democrat*, June 22d.

Go to Colusa

Woodland (Yolo Co.), June 20.—Lou Hartsock, who has been a resident of Woodland for many years and for several years foreman of the local plant of the Pacific Gas and Electric Company, has been promoted and will leave for Colusa on Wednesday. He will be the Superintendent of the Colusa district. His wife will remain in Woodland until the 1st of July. Hartsock has been recognized as one of Woodland's most enterprising business men and his wife has been active in society and fraternal circles. She has served a term as President of the local Parlor of Native Daughters.

—*Sacramento Bee*, June 20th.

Baseball

THE annual contest between the Heads of Departments, Pacific Gas and Electric Company, and San Francisco Gas and Electric Company is scheduled for two o'clock, p. m., Saturday, July 22d, at the St. Ignatius athletic grounds, San Francisco.

This is the third game, the first having been won by the Pacific Gas and Electric Company, the second by the San Francisco Gas and Electric Company, and those who may attend are promised an excedingly enjoyable afternoon, as the fight will be bitter, as the fat men have in the past year taken on considerable more weight, all of which will add to the enjoyment of the spectators.

The line up:

PACIFIC GAS AND ELECTRIC COMPANY

Newbert, L. H.	1st Base
Lisberger, S. J.	2d Base
Cantrell, R. J.	3d Base
Wilson, C. J.	S. S.
Caine, A. H.	Right Field
Henley, E. B.	Center Field
Wise, J. H.	Left Field
Lusk, Chas.	Pitcher
Downing, P. M.	Catcher

Substitutes.—Bridges, M. H.; Barbour, F. F.; Bubb, T. G.; Vensano, H. C.; Foote, D. H.; Walton, S. V.; Trowbridge.

SAN FRANCISCO GAS AND ELECTRIC COMPANY

White, D. A.	1st Base
Oldis, F. E.	2d Base
Varney, F. H.	3d Base
Bostwick, H.	S. S.
Holbterton, G. C.	Right Field
Pitts, H. P.	Center Field
Thompson, A. R.	Left Field
Butler, J. D.	Pitcher
Keppelmann, D. E.	Catcher

Substitutes.—Barrett, C. L.; Cronise, F. E.; Cunningham, John; Egelly, C. R.; Gray, F. S.; Gurnell, A. J.; McManus, J. J.; Morgan, W. R.; Stroh, Geo. N.; Walsh, L. F.

Mr. John A. Britton will umpire the game, and Mr. J. F. Wrinkle will be the official scorer. All disputes are to be settled outside of the grounds after the game.

A large delegation is expected from the outside districts, and the ladies are especially invited. A band of seventeen pieces will furnish appropriate music, and assurance is given in this case that the realized enjoyment will far exceed your fondest anticipations.

Making Him More Modern

Patient—Doctor, I'm having an awful lot of trouble with the gas on my stomach.

Doctor—Yes, yes, I know. Those old, old-fashioned fixtures are giving people a lot of trouble this fall. Just step into the next room and I'll have my engineer wire you for electric lights.—*Puck*.

Not long ago, while an Oakland ferry boat was approaching its slip on the Oakland side of the bay, an Irishman was observed, standing near one of the guard rails, intently watching the operations of one of Healy and Tibbitts big dredges, that was working nearby.

As he saw scoop after scoop taken up from the water and deposited on the bank, his face became a deep study.

A gentleman, who stood near him, observed the man's perplexity, and addressing him, said: "Well, my man, how do you like that?"

"Sure, it's mighty fine," he said in reply, "but the poor divils down below that fill thim buckets, must have a bad time of it."

T. E. Fogalsang.

A contract was recently closed with the firm of J. Lindenberger, Incorporated, at Pittsburg. This firm operates a large fish-canning plant at Pittsburg, in connection with which a refrigerating plant is required. Most of the electric power will be required for operating the refrigerating plant. The fish canned at this point are caught in the lower San Joaquin and Sacramento rivers and in Suisun Bay.

What the Press Has to Say

Will Double Gas Supply

Contract for Generator Let by Local Company

A contract to build a generator which will manufacture a million cubic feet of gas in twenty-four hours at the plant of the Pacific Gas and Electric Company at Front and T Streets has been let to the Petterson Construction Company.

This addition will practically double the gas-making capacity of the plant. The apparatus for purifying the gas was enlarged to a much greater capacity a few years ago.

The contract let yesterday was at the figure of $8,949.

—*Sacramento Bee*, June 30th.

Better Water for Southwest

Pacific Gas and Electric Co. to Build Sub Station in Near Future

Planning eventually to install a new substation for water supply in the southwestern part of the city, the Pacific Gas and Electric Company yesterday purchased an entire block of land, bounded by Center, El Dorado, Jackson and Clay Streets, from H. H. Thurstin and wife.

J. W. Hall, local manager for the company, states that no definite plans have been perfected thus far concerning the new plant, but he considers it likely that within the next few years a station of the very latest type will be built and placed in operation to afford better pressure for the southern section and to provide a greater water supply for the city.

The plans of the company, as outlined thus far, are to put up a building of attractive design, somewhat larger than that in the northwest, which will house electric pumps of modern design and capable of furnishing a large volume of water. It is likely that several shafts will be sunk on the property. No idea of the probable cost of the proposed building can be given at this time.

—*Stockton Independent*, June 27th.

Cable Placing Begins Today

District Manager H. B. Heryford of the Pacific Gas and Electric Company will start a crew at work this morning installing the cables in the underground system. This will be the last lap of the underground work, and as soon as the cables are in place the company will begin at once to remove the poles from the streets. The Pacific Gas and Electric's conduit system in Chico is one of the finest in the State, and a large sum was expended on it. The ordinance covering the conduit system requires 6,800 feet of cable, and the company will install several hundred more feet than is necessary under the ordinance. The cable arrived yesterday.

—*Chico Record*, June 28th.

New Power Line

The Pacific Gas and Electric Company are building a new power line from Electra to Sutter Creek and Jackson. The intention is to do away with the present line, as the business has outgrown it. The distance is over twelve miles. The increased power at the South Eureka, where a 400-horsepower motor has been installed, and the change from water power to electricity at the Argonaut, where a 500-horsepower motor has just been received, and is now in process of installation, has made the change absolutely imperative to keep pace with the changed conditions. The line will involve an outlay of $25,000, and will be completed in about two months—about the 1st of September. The wires of the new line are much heavier than the old, and will carry a much heavier voltage. The light system of Jackson will be greatly improved also when the new line gets into operation. Improvements are being made at Electra also.

—*Jackson Ledger*, June 30th.

QUESTION BOX

Ask questions. Any one of the several thousand men and women in the Pacific Gas and Electric Company who wishes information pertaining to any phase of the company's work or concerning matters of common interest to residents of any section reached by the company's lines is urged to use this department freely. Send your questions to the magazine. There will be no charge.

Question.—What is the friction loss of a roller bearing as compared with that of a high pressure step bearing?

Answer.—At high speeds a thrust roller bearing becomes very inefficient compared to the high pressure step bearing. In the roller bearing there is a direct contact of metal with metal, while in the step bearing the fluid is pumped in under a high enough pressure to lift the rotating member, carrying it on a film of fluid without any metal to metal contact.

Question.—What protection is afforded our customers supplied with alternating current, against the danger of high tension electricity on their premises?

Answer.—(*a*) The insulation between the primary and second winding of the transformer and (*b*) the fact that the low voltage side of the transformer is often grounded so that should the high tension current be accidentally impressed on the low tension side it will shoot to ground.

Question.—What percentage of its breaking strain should a white cedar pole carry on permanent work?

Answer.—Thirty-three per cent for pole line construction. C. F. A.

Question.—If the efficiency of operation of a steam engine or turbine is increased by improving the vacuum, is the economy reduced at times of low barometer and would it be lower if the plant were on a high mountain where the barometric pressure is less than at ordinary altitudes?

Answer.—The efficiency of operation of a steam engine or turbine depends on the initial pressure and final pressure of the steam. The pressure of the atmosphere has nothing to do with the efficiency, and is of importance only in connection with measuring the initial steam pressure and the degree of vacuum. In case of low barometer, or at a plant on a high mountain, the pressure of the atmosphere is less than under ordinary circumstances, but the absolute initial and final steam pressures may be exactly the same in the two cases, so that the efficiency would be unaltered.

For instance, the efficiency of a steam engine or turbine would be exactly the same under the two following conditions:

Barometer, inches of mercury.........	30.0	25.0
Atmospheric pressure, lbs. per sq. in...	14.7	12.3
Steam pressure, absolute lbs. per sq. in..	189.7	189.7
Steam pressure, gauge lbs. per sq. in...	175.0	177.4
Back pressure, absolute, in. of mercury	1.5	1.5
Vacuum as measured....	28.5	23.5

F. H. V.

Question.—Do the lines around lava gas burners indicate the amount of gas they burn per hour?

Answer.—Yes. One deep line indicates an hourly capacity of 4 cubic feet; one deep and one light, 5 cubic feet; one deep and two light, 6 cubic feet; four light, 4 cubic feet; three light, 3 cubic feet, respectively, per hour. C. N. S.

Question.—How much gas does the average gas stove burner consume?

Answer.—Thirty cubic feet per hour. C. N. S.

Question.—How is the kilowatt-hour loss due to "creepage" computed upon an electric meter whose dials indicate in kilowatt-hours?

Answer.—It is figured by allowing the meter to creep. With a stop watch the number of revolutions in a given time is noted. Knowing, then, the constant of the dial and the number of revolutions it makes in a given time, the kilo-watt consumption for any given length of time can be figured.

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THE PACIFIC GAS AND ELECTRIC COMPANY

SUPPLIES HEAT, LIGHT AND POWER TO

Place.	Population.	Place.	Population.	Place.	Population.
Agua Caliente	50	**Fair Oaks	250	**Palo Alto	6,000
*Alameda	23,383	Felton	300	Patterson	100
**Albany	800	Folsom	1,500	Penon Blanco	25
‡Alta	200	Forestville	100	‡Penryn	250
Alto	30	*Fresno	24,892	Perkins	200
Alvarado	200	Gilroy	2,000	**Petaluma	5,880
Allegheny	200	Glen Ellen	500	**Piedmont	2,000
‡Amador	200	‡Gold Run	100	Pike City	200
Angels Camp	3,200	Grafton	350	Pinole	1,500
Antioch	3,000	†Grass Valley	4,520	Pleasanton	2,000
‡Auburn	2,376	Gridley	1,800	Port Costa	600
Baden	1,500	Groveland	50	**Redwood City	3,500
Barber	200	Guerneville	500	**Richmond	6,802
**Belmont	600	Hammonton	500	Rio Vista	884
Belvedere	481	**Hayward	4,000	‡Rocklin	1,026
Benicia	3,360	Hollister	3,000	Rodeo	100
Ben Lomond	800	Ignacio	50	‡Roseville	2,608
**Berkeley	40,434	‡Ione	900	**Ross	556
Bethany	200	Irvington	1,000	Routier	30
Big Oak Flat	150	‡Jackson	2,035	***Sacramento	52,000
Biggs	750	‡Jackson Gate	50	San Andreas	200
Black Diamond	500	Kennedy Flat	50	**San Anselmo	1,531
Bohemian Grove	25	**Kentfield	200	**San Bruno	1,500
Brentwood	200	Knight's Landing	350	**San Carlos	100
Brighton	100	Larkspur	594	**San Francisco	416,912
Broderick	500	Lawrence	100	**San Jose	40,000
‡Brown's Valley	50	‡Lincoln	1,402	San Juan	150
**Burlingame	5,000	Live Oak	200	**San Leandro	4,000
Byron	200	Livingston	200	**San Lorenzo	100
Campbell	1,000	Livermore	2,250	**San Mateo	7,000
Camp Meeker	200	‡Loomis	150	San Pablo	1,000
Cement	1,500	Los Altos	200	**San Quentin Prison	1,600
Centerville	500	Los Gatos	3,000	**San Rafael	5,934
‡Centerville	20	Manlove	50	Santa Clara	8,000
**Chico	13,000	Mare Island	500	Santa Cruz	11,146
Chittenden	50	‡Martell	25	**Santa Rosa	7,817
**Colusa	1,582	Martinez	5,000	Saratoga	200
‡Colfax	400	**Marysville	5,430	Sargent	50
**Colma	500	Mayfield	1,500	Sausalito	2,383
Concord	1,500	Mayhew	50	**Sebastopol	1,233
Cordelia	150	**Menlo Park	1,500	Selby	100
Corte Madera	350	Meridian	300	Smartsville	300
Cordova	25	Middle River	75	Sonoma	1,200
Cornwall	300	Mill's College	150	**So. San Francisco	2,500
Crockett	2,500	**Milbrae	300	Stanford University	2,000
Crow's Landing	375	Mills	350	**Stege	100
Davenport	1,000	Mill Valley	2,551	‡Stockton	23,253
‡Davis	750	Mission San Jose	500	Suisun	1,200
Decoto	350	Mokelumne Hill	150	Sunnyvale	2,000
‡Dixon	1,000	Monte Rio	50	‡Sutter Creek	2,000
Dobbins	50	Mountain View	2,500	Terminus	50
‡Drytown	100	**Napa	5,791	Tiburon	100
Duncan Mills	150	Napa Junction	250	Tormey	150
Durham	500	†Nevada City	2,689	†Towle	200
‡Dutch Flat	400	Newark	700	Tracy	1,200
Eagle Nest	50	‡Newcastle	600	Vacaville	1,177
‡East Auburn	1,500	New Chicago	25	**Vallejo	11,340
**Easton	500	Newman	1,000	Vallejo Junction	10
**East San Jose	1,500	Niles	800	Vernalis	50
Eckley	20	Novato	250	Vineburg	200
Eldridge	1,000	**Oakland	225,000	Walnut Creek	350
‡Electra	50	**Oak Park	8,000	Warm Springs	200
Elmira	150	Occidental	400	Watsonville	4,446
El Verano	100	Ophir	50	Wheatland	1,400
Emerald	50	Oroville	2,500	Winters	1,200
**Emeryville	2,000	Orwood	50	**Woodland	3,187
Encinal	20	Oswald	25	Yolo	350
Fairfax	250	Pacheco	200	**Yuba City	1,160
Fairfield	800				

*—Gas	48,275
**—Gas and Electricity	847,139
‡—Electricity and Water	41,445
***—Gas, Elec. and Street Car Service	52,000
†—Electricity, Gas and Water	7,409
Unmarked—Electricity only	113,607
	1,109,875

Service Furnished.	Number of Towns.	Total Population.
Electricity	204	1,061,166
Gas	52	946,328
Water	20	42,894
Street Car	1	52,000

EMPLOYS 3,500 people
OPERATES 11 hydro-electric plants in the mountains
3 steam-driven electric plants in big cities
18 gas works

SERVES ⅔ of California's population
30 of California's 56 counties
An area of 37,950 square miles
⅗ the size of New York state
½ the size of all the New England states combined

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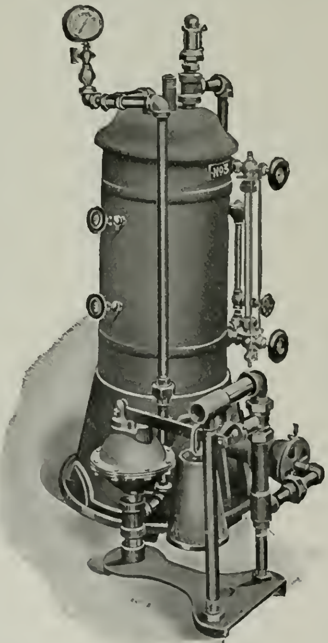

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remarkably quick
in its action

2 SIZES

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No. 3 is over $\frac{1}{2}$ H. P.

PRICES

No. 2 - - -	$65.00
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LOOK AT PICTURE
AND
NOTE HOW FULLY
IT
IS EQUIPPED

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Specialists in Steam and Hot Water Devices—Gas Fuel

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PACIFIC GAS AND ELECTRIC MAGAZINE

Published Monthly by
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SAN FRANCISCO

VOL. 3 ◆ AUGUST, 1911 ◆ NO. 3

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Pacific Gas and Electric Magazine

Vol. III

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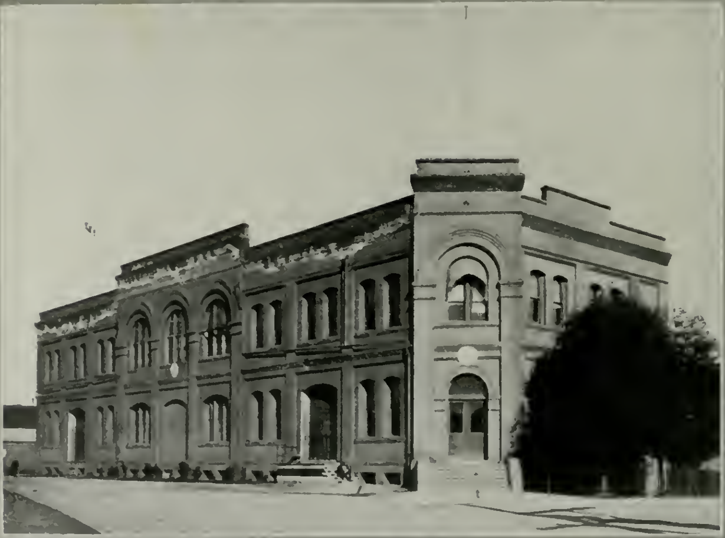

1—Sacramento Substation
2—Four Kilovolt Switching Compartments and Voltage Regulators.
3—Arc Machines in foreground, Motor-Generator Sets in background
4—Taking Bedplate of 1,000-Kilowatt Motor-Generator between Machines in Service
5—4,000-Volt Switching Compartments.

PACIFIC GAS AND ELECTRIC MAGAZINE

VOL. III AUGUST, 1911 No. 3

Pacific Gas and Electric Co. Progress in Sacramento

By J. O. TOBEY, Superintendent Sacramento Power Division.

J. O. Tobey

In order that the electric service supplied by the Pacific Gas and Electric Company, in the City of Sacramento, might be in keeping with the rapid progress and advancement of other industries, it was deemed advisable, by the company's engineers, early in 1910, that extensive improvements be made both in the distribution lines throughout the city and also in the substation equipment at Sixth and "H" Streets. These proposed improvements were brought about by the various existing conditions and requirements, a few of which are worthy of mention: first, the steady and permanent growth of the city's residence districts and business enterprises, which required an increased available supply of electric energy; second, the demand for a quality of service to equal if not surpass that of any city of its size in the west; and, third, the request of the people, through their municipal representatives, that the un-ornamental poles through the city's main thoroughfares, be dispensed with by placing the conductors underground.

In order to bring about these conditions, ground was first broken by the Distribution Department, preparatory to the laying of the underground cables in March, 1910. A part of the slow, tedious, and expensive work of laying the duct lines through the city streets was completed and the first cable pulled in May, 1910.

In the meantime, the work of increasing and improving the electrical equipment at the Sacramento substation had been placed under way by the Operation and Maintenance Department, actual construction work having begun on May 10th, 1910. Prior to this, orders amounting to many thousands of dollars had been placed with eastern manufacturers for electrical apparatus for the station equipment, and deliveries were already being made.

One of the first changes made was the increasing of the station's transformer capacity from 9,500 to 11,500 electrical horsepower. Then followed the building of fourteen fireproof 4,000-volt switching compartments, and the wiring of twenty-eight General Electric K2 15,000-volt oil switches installed therein; each set of which, together with the main buss bars, are in duplicate, thus allowing the killing of either set at any time for inspection or repairs, without interruption to service. Then came the installing of eight automatic voltage regulators on as many separate feeders, which gives an available regulated capacity of 12,470 electrical horsepower.

Don't forget to register before August 26.

These regulators alone, from the standpoint of the power consumer, mean more than the remainder of the entire installation, for, by their use, a voltage with a variation of two per cent or less is automatically maintained on the mains supplying the consumers' lights and motors.

Even the 1,800-kilowatt power load at the Southern Pacific Shops is provided with this automatic regulation of voltage. This is a great improvement over former conditions in Sacramento.

Laying Conduit in Sixth Street, Sacramento, showing substation in background

Due to the rapid growth of the city and the necessarily increasing load and lengthening of lines, it was deemed advisable to change the entire Sacramento distribution system form 2,300 to 4,000 volts. This was begun on a small scale in August, 1909, but little was done, however, until the above-mentioned 4,000-volt compartments and regulators were ready for service. The first 4,000-volt circuit was supplied from the new compartments on September 25th, 1910, and the last of the old 2,300-volt distribution service was cut over to 4,000 volts on the 19th of March, 1911. This may seem an excessive length of time for making the change, but after taking into consideration that most of the work was carried on during the short, rainy days of winter, when the peak station load exceeded 10,000 kilowatts, and accomplished with practically no interruption to service, the importance of the task can be better appreciated.

The Distribution Department had in the meantime laid conduits and pulled cables through two of the three districts, set aside by the city to be changed to underground, and by the end of March, 1911, virtually all of the output of the Sacramento substation was being delivered through underground distribution. The two districts referred to above cover that portion of the city bounded by Front, "H," Seventh and "L" Streets., or about twenty-four blocks square, which is being supplied entirely by underground service. All outlaying service is supplied by cables running through these districts and connecting to the overhead lines after leaving their boundaries. A total of 21 cables leave the station, consisting of eight three-conductor, paper-insulated, lead-covered, 4,000-volt cables; three arc circuit cables, carrying ten circuits; two duplex, lead-covered, paper-insulated, cables supplying the commercial 600-volt direct-current metallic circuit; one similar duplex cable for supplying the Southern Pacific, 600-volt, direct-current service, and seven simplex, lead-covered, paper-insulated cables supplying the Company's street-car system throughout the city.

In order to properly provide for handling the railway and commercial direct-current loads, great changes were made necessary to the old equipment of the Sacramento substation, and during the past six months the entire 600-volt direct-current switch board has been rebuilt. Old buss bars, meters, etc., were either overhauled or replaced by new, with the result that the direct-current switch board now consists of thirteen panels, each provided with a thoroughly modern and first-class equipment, which, together with its simplicity and flexibility of operation, leaves nothing to be desired.

In conjunction with the other improvements and to provide for the constant increase in the railway service, a contract was given the General Electric Company, in September, 1910, for a 1,000-kilowatt, direct-connected, two-bearing type, synchronous motor-generator set. This was received on Marth 20th, was installed in the place of a 400-kilowatt motor-generator set and placed in operation on April 23d, 1911. It has carried the lion's share of the Sacramento Railway load every day since, without a murmur.

Due to the lack of machine capacity, while setting up the large motor-generator set it was impossible to shut down the smaller unit while the larger was being erected in its place, so other means had to be provided. This was accomplished by assembling the larger machine on heavy wooden rollers beside the unit to be replaced, and, as all the switchboard and other wiring had previously been completed, but little remained to be done but to shut down and tear out the old unit and roll in the new. This required but a short length of time, although the unit when completely assembled weighed nearly forty-six tons.

Several other important improvements are planned for the Sacramento substation before the end of the year, but I will leave them to be a subject for some future article.

Nature's Favorite

By F. C. BIRKENSTOCK, Station J, San Francisco.

Tell me, ye Winds, that sweep the mighty main,
  And lash its liquid life to billows wild,
If, on your ceaseless course o'er sea and plain,
  Traversed a fairer land or clime more mild
    "Than California?"

Tell me, ye milk-white Clouds, that sail the blue,
  If on your downward view across World's face,
Thou shadest richer "Gem" of brighter hue,
  With gauze-like veil, as ye float on apace,
    "Than California?"

Tell me, thou Rain, that quench the thirsty soil,
  On mercy bent, as doeth the "Will of Him,"
Who gave and gives and knows our wants and coil,
  Dost thou thus bless a worthier ground or realm
    "Than California?"

Tell me, ye Lightning Bolts of mighty Jove,
  That rend the humid void with vivid glare,
Couldst thou show "Nox", whose star-decked Mantle Shrove
  More winsome maid for lover's arm to dare
    "Than California?"

O, tell me, Dew, on emerald's mead's and lawn,
  Where would thou rather dwell in glistening sheen
And drink the rose's perfumed breath at dawn,
  Or spread your jewels on the twilight green,
    "Than California?"

"The Shadow Box"

Reverting to the editorial in the June, 1910, issue of the Company Magazine, we find these inspiring lines:

"The call to the country, the return to nature, the freedom of the great outdoors. This is the season. The summer vacation feeling is stirring in the cities."

Following out, in a measure, the suggestions contained in this editorial, Mr. George C. Holberton has recently acquired what he terms his "country estate," of several acres of land in the rolling foothill country back of Redwood City and westward toward the coast.

While Mr. Holberton has owned this tract of land for some time, and has spent a number of recreation hours in fencing in the property, it has only been within the last several months that he has evolved the idea of constructing thereon a bungalow, and spending the summer months in this ideal location. He has, during his spare hours, constructed a country home in the shape of a small, one-story bungalow, rough board and battened exterior, with shingled roof, and an artistic wide veranda front, which promises to pay him in renewed energy and health, in addition to the pleasures thus given to his family in having a wide free range as a country outing place.

Mrs. Holberton has very appropriately christened the bungalow "The Shadow Box," as not only do the pleasant breezes penetrate to the interior, but the overhanging trees cast their cooling shadows over all during the warm summer days.

Cut No. 1 shows the cottage partly constructed. No. 2, as it is nearing completion, located on a beautiful level stretch of meadow, amidst the shade of beautiful oaks, and backed by rolling foothills.

Cut No. 3 shows the application of the finishing touches to this quaint little bungalow, with Mr. Holberton putting in a Sunday morning in the enjoyable pastime of painting the shingled roof.

Not only has the erection of this bungalow been a source of enjoyment to the General Manager of the San Francisco Gas and Electric Company and his immediate family, but a great number of the employees of the San Francisco Gas and Electric Company and the Pacific Gas and Electric Company have also spent numerous pleasant Sunday outings on these grounds, through which a clear stream runs, and have also taken a part in the construction of the house.

The different boys have applied their different lines of knowledge, some in the laying of foundations, others in the rough heavy work of running up the superstructure, and others in helping to lay the side boards and battens and shingling the roof. The electricians have run the wires, and assisted in locating and hanging the fixtures, as the house is electric lighted off from a pole line, specially constructed by Mr. Holberton, from the main feeders of the Pacific Gas and Electric Company that traverse the peninsula. Thus a two-fold benefit has been derived in affording a continuous source of enjoyment to the permanent occupants of this property, and meting out to those less fortunate, a place to spend a quiet, healthy day's recreation in the country.

Mr. Holberton at the time he was appointed General Manager of the San Francisco Gas and Electric Company, with the added duties imposed upon him, was not in the best of health, and he feels that a better bargain could not be arranged than the acquiring of this country home with the free outdoor life which it affords him.

Cut No. 4 shows a group of the San Francisco boys on one of their Sunday outings, and Cut No. 5, another group resting under the beautiful shady overhanging oaks in which this property abounds. R. J. C.

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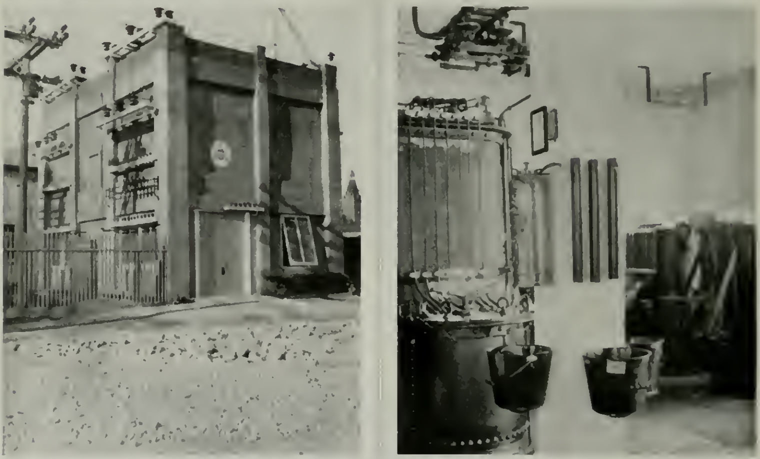
Arrangement of Fire Fighting Apparatus

By W. T. TYLER, Redwood District.



FOR the size of the station, the Redwood City substation probably has the best equipped and most handy fire-fighting apparatus of any station belonging to the company.

Located around a square pillar in the center of the room, which is clear of all electrical apparatus but still handy to any place in the station, are three separate kinds of fire-fighting apparatus, consisting of sand, chemical powder and liquid chemical fire extinguishers. The sand is kept in round bottom buckets which set on iron rings, one on each side of the pillar, and about two and one-half feet from the floor. Above the sand buckets are placed two sets of three chemical powder and one liquid fire extinguisher.

Just inside the side door of the substation is another fire extinguisher set, composed of four cans of powder and one liquid extinguisher.

Mr. J. F. Dwyer, station foreman and formerly chief of the San Jose fire department, has placed the fire-fighting apparatus with an idea of keeping it absolutely clear of all electrical apparatus, so as to give the maximum amount of fire protection with a minimum amount of personal danger to the men in the station in case they have need to use the fire extinguishers.

A commodious fireproof warehouse building has just been completed for the General Electric Company in New York City. This new building will be ready for occupancy about April 1st.

The new warehouse, with its increased floor space and improved shipping facilities, will enable the company to carry a much larger stock to meet the demands which have grown far beyond present accommodations. It is located near the shipping center of New York and close to the principal steamboat piers.

The Tennessee Mountains of California

By R. J. CANTRELL, Property Agent.

THE high mountains of Mendocino County, California, with their scattered population and peculiar modes of existence, are so symbolical of the stories we have all read of the life in the mountains of Tennessee, that the likeness is striking, to say the least, although the writer has never been so fortunate in his travels through this section during the past ten years, as to secure any "moonshine" whiskey, the local supply apparently being imported, and quantity takes precedence over quality.

Perhaps the altitude, coupled with almost perfect climatic conditions in these high mountains, with their pine-capped summits and beautiful foothills studded with oaks, manzanita, laurel, etc., have a tendency to create in some of the inhabitants a listless, careless mode of existence that may account in a measure for the apparent dream, come-day, go-day existence that seems to predominate.

Be the reason what you will, these people who have spent years in the fastnesses of these mountains, are peculiar to say the least.

There are families without any apparent means of support, and large ones at that; one in particular the writer recalls, of eleven children, father and mother, who lived in a two-room cabin, the children ranging from babies to young men and women of almost age, and all lived in happy contentment; the greatest effort exerted being in the avoidance of anything that looked like work, though they will walk ten miles and half the night to attend a dance and return home sometime the next day. Time is an unknown quantity. The smaller children are almost on a par with their predecessors in the possession of these mountains, the Indian, in that a gingham one-piece dress covers the little girls, and a blouse and a pair of breeches of any old length provides for the boys.

Speaking of the Indian, rumor has it in the immediate vicinity of this particular family, that the shack they call a home, was formerly occupied by an Indian and his squaw, who were dispossessed by the present occupants.

As an example of the fear of work which seems to be inborn in these people, two of these boys, one about seventeen and the other about nineteen, the former long and lanky, the latter strong and rugged, came to a ranch house in the vicinity, sat down to rest for an hour or two, and then opened the following conversation with the ranch manager:

"Got any wood to cut?"

"Yes."

"How much?"

"Two dollars a tier."

"Board too?"

"No; you pay your own board."

"How much?"

"Two bits a meal."

"All right. When can we go to work?"

"Now."

It was then about 11 A. M. They waited and had a meal first. They then took an ax and a cross-cut saw, and started out and did not appear until supper time.

To make a long story short, they worked and rested three or four days and had about forty cents coming to them after deducting meals, and then quit, as they said they had worked long enough, and were going over the mountains to work on the railroad.

They returned in about three days, having probably walked about fifty miles of rough mountain trails, and stated they did not care to stay over there, as "they wasn't going to work with a lot of Greeks and Hindoos."

They cut wood for a couple of days more, and then got tired and wandered away, having earned tobacco at least for a week or two.

This happened in October and the rainy

season was coming on, but why worry? Their existence in the winter months depends upon the number of deer in the vicinity, and an occasional stray hog, and sometimes a young bullock disappears, and evidently goes toward fattening the larder of these nondescripts.

They are, without doubt, the most highly educated artists in the use of blasphemous language on the continent, and even the mere babies have a vocabulary of "cuss words" that would make your hair stand, and which language is applied to anything or anyone on the merest provocation.

They come and go, they have no gray hairs, they live long and are happy; the most difficult problem confronting them being just enough to eat and some chewing tobacco.

U. S. Government Experimental Work on the Gum of the Abatiene Tree

By I. B. ADAMS, Superintendent De Sabla Power Division.

I. B. Adams

Up in the northeast corner of Butte County, at an elevation of 5,400 feet, about twenty-five miles north of the de Sabla power house, and about three miles south of the Company's Round Valley Reservoir, the forest service branch of the United States government is carrying on a very interesting experiment on the gum or sap of the Abatiene tree, in order to determine its medicinal values, and to ascertain if the industry could be handled profitably. This abatiene grove is unique, in that it is the only grove of its kind in America. Mr. Eaves, who is in charge of the work in Butte County, informs me that the tree grows in only two known places in the world: on the western slope of the Sierra Nevada Mountains, and in Normandy, Europe. The Abatiene is a species of pine,

very similar to our black sugar pine; in fact, it takes an expert to tell the difference between the trees. The average size of the trees is about three feet in diameter by one hundred and twenty feet high.

The government is keeping a careful record of the flow of gum from each tree per month, each tree is numbered on a round metal tag, which is in turn nailed to the tree, as shown in the photo to the left of the forest service man. In order to collect the gum from the tree, a 10 x 12 inch scarf or blaze is cut into the tree about six inches above the level of the ground, two grooves are cut diagonally across the blaze to lead the gum into the 2 x 4 x 8 inch galvanized iron cups, fastened to the tree at the bottom of the blaze. The trees are blazed on three sides, an average of one quart of gum every two weeks is secured from each tree, the young trees being by far the largest producers.

The gum is collected every two weeks, the cups are emptied into buckets, and then emptied into barrels hauled as close as possible to the trees. And at the same time a two- or three-inch strip of bark is cut away from the top edge of the blaze, in order to get a fresh flow of gum. Next season the cup will be moved to the top of the blaze, a new section of bark cut away, and each year the cup will be moved higher up the tree.

The work is in charge of F. C. Eaves, who has one thousand cups out, and to date has collected two barrels of gum, which will be shipped to Washington, D. C., for analysis.

Years ago private parties operated on the abatiene trees, making a patent medicine from the gum, which was guaranteed as a cure for all the ills the flesh is heir to. The remnants of their still is still in evidence, about two miles from where the accompanying photos were taken. The government put a stop to their operations on account of the destructive methods of tapping the trees. All of the abatiene grove is now included in the national forest reserve.

The government is also making experiments on the gum of the tamarack from the same locality.

The forest service men have great hopes of making a profitable industry in California from the gum of the abatiene tree.

The following trade items have been received from Mr. Van E. Britton, local representative of the Bartlett-Hayward Company:

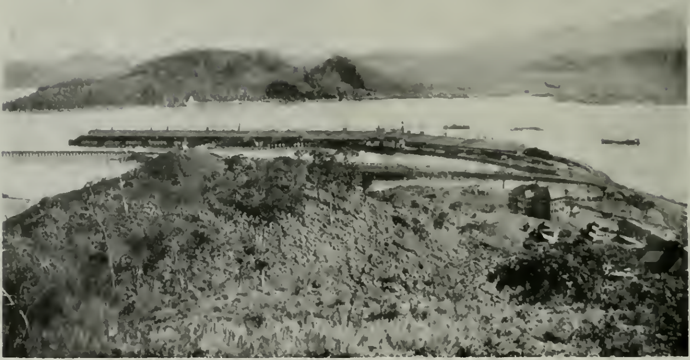
This concern is erecting for the Brooklyn Union Gas Company, at Newton, L. I., a 10,000,000-cubic-foot gas holder. This holder will be painted with No. 31 National Paint Work's Holder Paint. The tank and lifts will be painted with No. 31 red oxide, and the guide frames with No. 1908 Holder Frame Green.

This same company is also erecting for the Public Service Corporation at Jersey City, New Jersey, a 2,000,000-cubic-foot holder. The tank and holder is being painted with No. 31 red oxide, and the frame with No. 112 National Paint.

Panama Canal

Balboa Docks—Pedro Miguel Locks

By J. G. BUBB, Office of Property Agent.

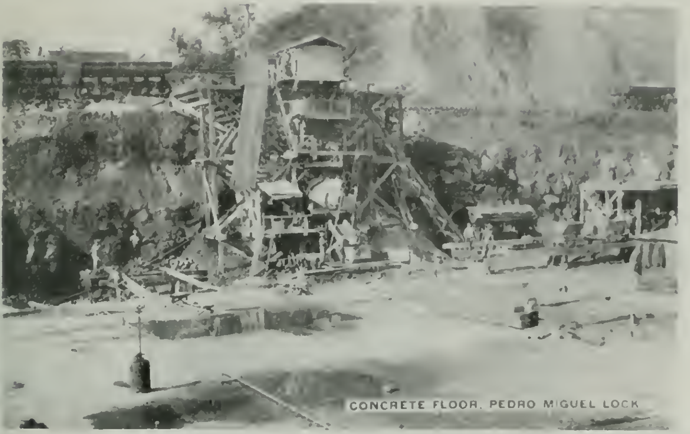


APROPOS of the opening of the gigantic work known as the Panama Canal several years hence, and as it is in the public eye to a more or less degree, it might not be amiss to embody a brief description of the views shown herein.

The first one shows the large docks at Balboa,—formerly named "La Boca," meaning the mouth,—at the Pacific entrance of the canal. This wharf is capable of berthing seven or eight large ocean-going vessels at one time and is provided with modern cranes for the expeditious handling of freight. It is the terminus of the Panama Railroad Company, operating across the Isthmus, and is under the control of that company. In the above picture at the left center is shown the shore end of the trestle extending three miles into the Bay of Panama for the purpose of constructing a breakwater to an island called "Naos," three miles distant in the Pacific, which will prevent the movement of the tides from washing silt into the channel of the canal.

Across the channel from the dock, at the water line, may be seen a number of discarded dredges, relics of the French Company. In mid-channel, at the right, is seen a self-propelling dump scow,—a number of which were inherited from the French,—which is still doing serviceable work. These were rebuilt by the Americans; the boilers have been equipped for oil-burning and the machinery installed is of sufficient horsepower to propel them at a speed of from six to eight knots, loaded, to ten and twelve knots, light. A sea-going suction dredge operates in the channel, for a mile or more inland from this dock, keeping the channel clear, which is navigable for light draft vessels for about three miles inland.

In cut No. 2 is shown a temporary con-



CONCRETE FLOOR, PEDRO MIGUEL LOCK

crete mixer which was used for mixing the ingredients necessary for the floor of the lower lock at Pedro Miguel. At the top are shown a number of modern dump cars, the operation of which is controlled by air pressure supplied from the locomotive hauling the trains. At the bottom is shown a steam crane which handles the mixture from the base of the mixer to the industrial railroad over which it is transported to the various points of the work. Opposite the "Wells" (see light, left foreground), are shown openings in the floor of the lock; these are the outlets from the subterranean tunnel through which the water will enter for filling the lock chamber. This view was taken about two years ago, the work at the present time being very much more advanced, the side and center walls of the lock having since been built.

Pioneering

GOING back into the period prior to the installing of hydro-electric power houses in the Sierra Nevada Mountains, it was necessary to secure statistics as to available water supplies, the topography of the country surrounding such water supplies, the possibilities for ditches and flumes to convey water to the power house site, the question of the best course for the construction of transmission lines, and after all this data had been secured, to make final figures as to whether or no, from a business point of view, the project was feasible and would be profitable.

Cut No. 1 shows a group of engineers starting on a long tramp loaded down with their blankets, instruments and general camp equipment, to find their way into the wilderness, establish a headquarters from which to operate, and gain the information required of them.

5

The second cut shows a rough shake cabin, constructed at one of these camps as a temporary headquarters and base. Miles and miles of rugged country have to be traversed before they finally reach their destination, and wind down into deep canyons to the water courses, where wild torrential streams wend their way out of the snow-capped mountains toward the valleys.

Cut No. 3 shows the rugged rocky wastes in the bottom of one of the canyons on the head waters of one of the streams in the company's system.

Ofttimes many interesting features are encountered by these pioneer engineers, as for example, the old abandoned saw mill hid away in the center of what was at one time an immense forest, until the pioneers in the lumber business erected their camps and mills, cut out the timber, and transported it to some growing community.

Cut No. 5 represents an old cabin with a very unique and interesting history, of a man who conceived the idea of exiling himself in the wilderness for the purpose of slaughtering deer and preparing the venison for the markets, on a wholesale plan, that as he supposed would bring him in a large perpetual income. The game wardens, however, interfered, and he died before accomplishing his purpose.

These are only a few of the experiences encountered when you get off the beaten trails and which go to offset some of the physical hardships which must be endured by those who blaze the way into new territories.

No. 6

No. 7

When water courses are reached, which are to be examined, and about which data is required, it is then necessary for the engineers to build rough weirs and water gauges, in order that the flow of water may be measured and data secured during the long periods covering the early spring freshets, and into the hot summer months, when the snow is working off from the high peaks, and this vigil must be kept up until late in the fall when the snow has disappeared and before the rainy season sets in, in order that true and accurate figures may be had during the extreme seasons, and which enter into the final conclusions of the enterprise.

Cut No. 6 shows water running over the weir, and No. 7 shows a primitively constructed gauge for measuring the flow of water as it passes over the weir.

R. J. C.

$10,000,000 Power Plants to Improve Service Here

Great Extensions Are Now Under Way by Pacific Gas and Electric Company

San Francisco Examiner, July 9th.

TEN million dollars are to be expended by the Pacific Gas and Electric Company in extending its power supply system, the plans for the perfection of which were completed yesterday.

The additional hydro-electric capacity of the company's system will include a tower line from a power plant on Bear River, Placer County, to the bay centers.

The power plant is to be erected on property that was formerly owned by the South Yuba Water Company's system. This system was absorbed by the Pacific Gas and Electric Company early in the year.

The South Yuba Water Company's system has been used for the generation of power at four power houses and has an aggregate capacity of 10,000 horsepower. The Pacific Gas and Electric Company now has a total capacity in eleven installed plants of over 90,000 horsepower and in steam plants over 50,000 horsepower. The plans in the proposed extension will give the company an additional 71,000 horsepower.

DAM IN SOUTH YUBA.

Plans in the proposed extension also include the erection of a dam in the canyon of the South Yuba River below Lake Spaulding, which will increase the present existing power storage that is obtained from fifteen lakes in Nevada and Placer counties by 2,500,000,000 cubic feet.

From this storage the water will be conveyed through tunnels and ditches to Bear River. The first plant will have a head of 1,647 feet, developing 50,000 horsepower, and the second plant will have a fall of 750 feet, with a capacity of 21,000 horsepower, both power houses utilizing storage water, the second power house picking up the water from the first power house on Bear River through canals at present existing and used for irrigation purposes.

This additional storage of water will not only add to the possibilities of the company's power development, but will be used subsequently for irrigation of the additional acreage which is rapidly being developed in Placer County for fruit growing purposes.

Active work has already been commenced on the dam site below Lake Spaulding. Surveys have been completed for all tunnels and canals necessary and plans and specifications made, in which bids will be invited for the equipment. Rights of way are being obtained for a tower line to tie in with the present system of the company, which now covers the entire portion of Central California, and aggregates, in high tension lines alone, over 1,100 miles. This installation, the largest attempted so far in the State, will be of material help in the development of all classes of industries in California which have been fostered in the past for the possibilities of cheap power through hydro-electric development.

John A. Britton, Vice-President and General Manager of the Pacific Gas and Electric Company, yesterday voiced the opinion that this development would, as previous developments of similar character had done, more fully develop the industries of California and permit the establishment of manufactories, the reclamation of overflowed lands and the irrigation of arid lands by means of electric power that has long been sought for the great valleys of the State.

"It has been our experience in operating hydro-electric plants in this State," said Britton, "that developments made were rapidly absorbed. While at first the market was not visible, the presence of cheap power has resulted in the establishment of many new industries.

AIDING IRRIGATION.

"There is no more potent factor in the development of California than the possible irrigation during the long spells of the dry season by the installation of electrically-driven pumps for that purpose, and the desolate lands of the Sacramento and San Joaquin valleys would not be the profitable agricultural lands that they are now had it not been for the installation of long distance transmission current from hydro-electric plants."

"The company has recognized the necessity for additional power in this State throughout the 33,000 miles of territory which it serves, as has been apparent of late in the division of large land holdings into small acreage tracts, and which have brought about the increases in land for power.

"Tied in, as it will be, with the present existing eleven power houses of the company, the new development will give a guarantee of service at such a minimum cost to compel the utilization of electric energy in all industries and for all agricultural purposes where power can be employed."

The new banking and office building with a frontage of 50 feet on Broadway and 100 feet on Eleventh Street, recently constructed for the Security Bank and Trust Company, in the heart of Oakland's business center. This building is supplied with power and light by the Oakland Gas, Light and Heat Company.

The Redwood City Fire Alarm System

By J. F. DWYER *and* W. T. TYLER, Redwood District.

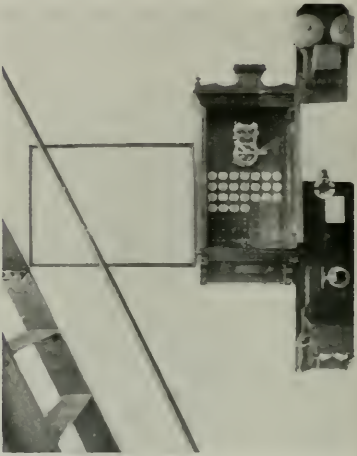
THE City of Redwood has recently installed and put into successful operation the Gamewell Fire Alarm System. There are twenty street boxes of the latest improved type, located so that the town is well covered.

In sounding an alarm a large steam whistle situated at the Frank tannery, where steam is always kept up, is automatically blown by pulling the hook in the alarm boxes. This whistle sounds a number of blasts corresponding to the number of the box from which the alarm is turned in, and repeats the alarm four times.

Gongs and tape registers are located in the different engine houses, while tappers are placed in the residences of the Chief of the Fire Department and the City Electrician. A repeater is located in the substation of the Pacific Gas and Electric Company, as is shown in the accompanying illustration. This apparatus is for the purpose of turning in alarms received by telephone.

A person wishing to turn in an alarm by telephone calls up the substation, and, if possible, gives the number of the nearest fire alarm box to the fire. If the number of the box is not known, the location of the fire is given and the operator on shift determines the number of the nearest box to the fire, by means of a map shown at the left of the illustration. He then places a cam, notched to correspond with the box number, on the shaft of the repeater and pulls down the lever, the same as one would at a street box; thus turning in an alarm as though it originated at the street box nearest the fire.

The system is operated by two sets of storage batteries of fifteen cells each. One set is used every other day while the other is charging.



The batteries are charged by a one-half-horsepower Hawthorne motor-generator set, the power for which is furnished by the Pacific Gas and Electric Company, at a cost of about five cents per day.

The fire alarm switchboard batteries and charging set are located in the town hall.

The total cost of the system ready to turn over to the city for operation was $5,100.00.

Control of Gasoline Lighting in Pueblo, Colorado

Electrical World, Sept. 29, 1910.

An ordinance recently passed by the City Council of Pueblo, Colorado, places all gasoline vapor lighting outfits under the supervision of the city electrician. The ordinance also stipulates that all tanks, carburetors, generators, etc., must be placed outside the building, and tanks holding over five gallons must be buried three feet underground. A penalty of not less than $5 nor more than $100 will be inflicted upon any one disregarding the law.

What the Press Has to Say

Knights Landing Branch of Power Company's Line Busy

Motors for Irrigating Purposes Installed in Many Places and the Work Continuing

The Knights Landing branch of the Bay Counties Power line is very busy these days and business is rapidly increasing. The increase is due mainly to the installing of motors for irrigating purposes. Last year a 350-horsepower motor connected with a Price centrifugal pump was installed on the Fair ranch. It was the means of saving the ranch from flooding, and as a result a bumper crop will be raised on the Fair ranch this season. The good results attained from the use of this motor doubtless prompted others to try the experiment.

The Alameda Sugar Company has installed a 100-horsepower motor on the Morris ranch No. 2, and a 75-horsepower motor on the Morris ranch No. 5, near Knights Landing. The same company will soon commence irrigating with their 150-horsepower motor, recently installed on the Peart place. Lindsay Morris has a 50-horsepower motor pumping from two wells and irrigating eighty acres of alfalfa. J. W. Gallup has a 10-horsepower motor, and M. R. Dozier a 15-horsepower motor, both directly connected with centrifugal pumps drawing water from Cache creek. H. E. Coil has a 20-horsepower motor directly connected with an eight-inch centrifugal pump pulling water from two wells for irrigating forty acres of alfalfa. Asa W. Morris is installing a 50-horsepower motor directly connected with a ten-inch pump.

Woodland Democrat, July 14.

Improve Water System

AUBURN (Placer County), July 25.—The Pacific Gas and Electric Company has a crew of men laying a 16-inch pipe from the reservoir to near the viaduct, near the depot. This is considered one of the biggest and most important improvements by the company in Auburn for a number of years.

Sacramento Bee, July 10.

Plant Not to be Considered

"The new commission has no time to consider impossible schemes such as the acquiring of a municipal gas plant would be at the present time," said Mayor W. J. Tormey this morning. Aside from the complaint of fumes recently made, the patrons of the Pacific Gas and Electric Company are well satisfied with conditions as they are, and the city has recently granted permission for the extension of lines on several streets. There is no near possibility of considering a municipal plant, as it is impractical.

Vallejo News, July 15.

Heavy Cable Has Been Laid

Force of Men Has Been at Work in Channel for Pacific G. & E. Company

For the past week a force of men under the direction of Fred Maynard of Antioch, assistant superintendent of the Pacific Gas and Electric Company, has been engaged in laying a big cable from the northern shore of Vallejo across to Mare Island.

The task will probably be completed at noon today.

The cable is 2,250 feet long, weighs 15 tons, and carries 15,000 volts.

The cable arrived at South Vallejo on a car and was transferred to the barge from which the laying process was handled.

The big undertaking of getting the huge wire on the barge and the actual laying and connecting occupied just three full days, and Assistant Superintendent Maynard is elated at his success in completing the job in such a short time, considering the fact that his crew is composed mostly of green hands.

Vallejo Times, July 21.

Don't forget to register before August 26.

Alameda County Lets Contract for Lighting

OAKLAND, July 11.—The Board of Supervisors yesterday renewed its contract with the Oakland Gas, Light and Heat Company for furnishing light and power to the county.

Under the new contract the county will save $246.71 a year. The Central Oakland Light and Power Company, the new Smith-Tevis corporation, which put in a lower bid than the gas trust, could not furnish electricity to the county infirmary nor to the detention home, and for this reason lost the contract. The new rates are 3 cents per kilowatt hour for light and 2½ cents for heat.

San Francisco Bulletin, July 10.

Will Begin Construction of Big Storage Tank

Contractor James Nesbitt is preparing the grounds for the erection of the immense steel gas storage tank for the Pacific Gas and Electric Company in East Petaluma. This immense tank, holding thousands of cubic feet of gas, will be the largest of its kind north of San Francisco, and will avoid the possible contingency of a shortage of gas which would be ruinous to hundreds of incubators in operation for several months each year.

Darby Laydon, bridge and wharf builder of San Francisco, is here to superintend the construction of the big tank, which was made in the east and shipped here in sections.

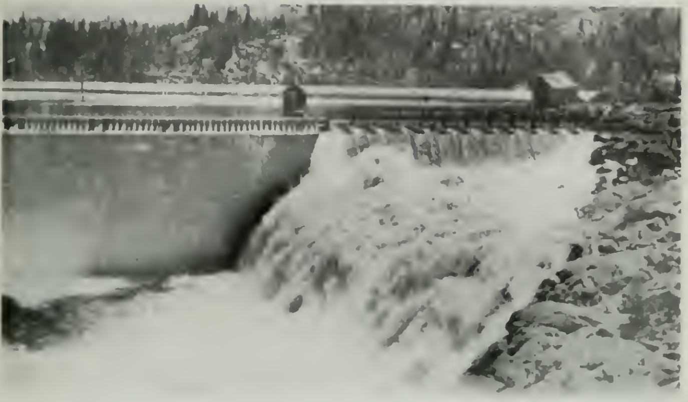
Petaluma Courier, July 11.

Marine News

By E. E. DODGE, Assistant Hydrographer.

WHILE the principal business of the Pacific Gas and Electric Company is the distribution of gas and electricity, we are also gradually developing a marine department with several very proficient captains, mates, "bosens" and able-bodied seamen.

The company operates a launch in the reclamation district on the river below Stock-



ton, has a launch on Lake Vera, and a launch on Lake Fordyce.

The illustration accompanying this article shows the launching of a new launch recently shipped from the bay to Lake Spaulding, near Emigrant Gap, on the main line of the C. P. R. R.

This boat is about 30 feet long, with 7-foot beam, and a draught of 3½ feet. It is equipped with a 20-horsepower gas engine, and has been placed on Lake Spaulding to be used in clearing the lake of accumulated logs and driftwood.

Every year as the flood waters come on and empty into the lake, an additional amount of old logs and driftwood is picked up, carried down the streams and deposited into the lake. These accumulate and gradually work down against the dam, and in spite of the fact that guard booms are usually constructed, to ward off this debris, a jam forms and blocks the spillway, preventing the water from flowing out through the spills, and consequently forces it over the top of the dam.

This particular job of cleaning Lake Spaulding will necessitate the removal of logs and driftwood from approximately 250 acres of the lake's surface, which driftwood will have to be dragged to one end of the lake by the launch, and then, with the assistance of a donkey engine, will be dragged ashore and finally burned.

The second illustration with this article shows the face of Lake Spaulding Dam and one of the spillways.

Eliza's Mistake

The gentle Eliza was sitting drearily in the darkened room, waiting miserably for a visitor, whom she feared would never come. To tell the truth, Eliza and William had quarreled bitterly the night before. But what is that? A ring, a step, a masculine voice. She waited not, but threw herself into the visitor's arms.

"Oh, my darling," she sobbed, with her head upon his bosom. "I am so glad you have called. I did so long to make up and do my best to pay you for bringing light into my life. Let us settle peacefully once more with each other."

"Well, miss," said a strange voice, "I'm willin', I'm sure. But my instructions is that if you don't I'm to cut orf the gas!"

And it was only then that Eliza found out she had mistaken a common gas person for her William."—*Tit-Bits.*

Flag Raising at Gas Works, San Jose

By HERBERT CHAPMAN HUNN, San Jose District.

Our Flag is there,
Our Flag is there,
We greet it with three loud huzzas.
Our Flag is there,
Our Flag is there,
Behold the glorious Stripes and Stars.

ON Monday afternoon, July 3d, 1911, amidst the cheers of the assembled people and the roar of cannon, Old Glory was raised slowly to the top of the new mast erected at the Gas Works of the Pacific Gas and Electric Company and waved proudly in her natural element.

Thomas O'Connor, the oldest employee of the Company, managed the halyards and carefully raised the flag. Mr. John D. Kuster, the Manager of the Company, made a short talk. He paid a splendid tribute to the flag, saying, in part, that in times of peace the flag was an inspiring sight, one that would cause the blood to flow more quickly, but that in times of war it became doubly so; and that defeat was oftimes turned into victory at the sight of the stars and stripes leading the advance. He complimented the men on their patriotism, saying that men who paid homage to the flag in times of peace would protect it with their lives in times of war; also that the country depends to a great extent on her working men to carry out her destinies. He also complimented the ladies upon the interest they had taken in the proceedings.

Councilman Walter G. Mathewson, the next speaker, said that he would go anywhere

Hesbert C. Hunn

Thomas O'Connor

to see Old Glory unfurled and would pay tribute to her so long as he had voice to raise. He was pleased to see the good feeling which existed between the Manager of the Company and the men, and believed that as time rolled on, the same spirit would increase. Several others spoke along the same lines.

This affair, which terminated so pleasingly, was brought about through concerted effort between the Manager, Mr. Kuster, and Superintendent Hargreaves, and the employees of the Company at the works, and the results are, as stated above, we have a magnificent flag waving sixty-five feet high. May she wave as long as the sun doth his daily courses run.

Thomas O'Connor—the man selected to raise the flag to its position at the top of the mast, has been a faithful and loyal employee of the Gas Company for twenty-two years. He occupies the position of purifier-tender and night watchman.

Herbert Chapman Hunn—the "Master of Ceremonies" at the Flag raising, at San Jose Gas Works, July 3, 1911.

Mr. Hunn has been employed as engineer at the works for more than nine years. He takes an active interest in everything of a civic nature and has the honor of being Past President of the First Ward Improvement Club. He is full of patriotism, and is a good booster for everything good. He is affectionately referred to among his fellow workers as "Brother Hunn."

"The Boys"—a happy, big-hearted bunch of Gas Workers who are proud of the Company with which they have grown up.

The following interesting figures taken from a boarding-house report, conveys an excellent idea of the average quantity of supplies necessary to care for a gang of one hundred rugged men, out on construction work:

STAPLES

Beans (bayo)	lbs.,	64
Beans (white)	"	269
Beans (lima)	"	9
Beef	"	2851
Butter	"	296
Bacon	"	110
Baking powder	"	38
Crackers (soda)	"	151
Coffee	"	126
Catsup	gals.,	16
Cinnamon	lbs.,	1.3
Cornstarch	"	27
Cornmeal	"	45
Codfish	"	91
Curry powder	"	0.5
Cheese	"	93
Extracts (L. & V.)	gals.,	2
Eggs	doz.,	163
Flour (white)	lbs.,	2090
Flour (graham)	"	91
Hams	"	276
Lard	"	245
Mutton	"	236
Macaroni	"	73
Milk (fresh)	gals.,	28
Milk, (condensed)	cases,	14
Mustard	cans,	7
Mush (wheatflakes)	lbs.,	18
Oats (rolled)	"	164
Oatmeal	"	87
Onions	"	353
Pork (fresh)	"	122
Pickles	gals.,	7
Potatoes	lbs.,	3745
Pepper	"	5
Rice	"	136
Sago	"	91
Sugar	"	1941
Sugar (brown)	"	29
Soda (baking)	"	22
Soda (washing)	"	4
Sapolio	bars,	5
Cleanser (Dutch)	cans,	53
Soap (laundry)	bars,	64
Syrup	gals.,	28
Spaghetti	lbs.,	127
Salt	"	127
Toothpicks	small boxes,	2
Tea	lbs.,	36
Veal	"	668
Vinegar	gals.,	11

VEGETABLES AND FRUITS

Apples (evap.)	lbs.,	91
Apricots (evap.)	"	91
Beets (fresh)	"	55
Cabbage	"	263
Carrots	"	402
Currants	"	9
Peaches (dried)	"	18
Prunes	"	160
Peas (green)	"	131
Rhubarb (fresh)	boxes,	5
Raisins	lbs.,	46
Turnips	"	18

CANNED STUFF

Apricots, No. 2	qts.,	24
Apples, No. 8	gals.,	27
Blackberries, No. 8	"	40
Blackberries, No. 2	qts.,	14
Beans (string), No. 8	gals.,	40
Corn, No. 2	qts.,	120
Oysters, No. 2	"	42
Pears, No. 8	gals.,	42
Plums, No. 8	"	11
Peaches, No. 8	"	22
Peas	"	31
Pumpkins, No. 8	"	4
Pears, No. 2	qts.,	4
Tomatoes, No. 2	"	40
Tomatoes, No. 8	gals.,	27

The General Electric Company report that they have just received an order for 6,000 of the latest type of serious luminous arc lamps, together with a complete mercury arc rectifier station equipment of 9,000 lamps capacity, from the Union Gas and Electric Company of Cincinnati, Ohio.

This order is reputed to be the largest single lamp order ever received by any manufacturer of lamps, and shows a total value of close to half a million dollars. When these 6,000 lamps are installed in Cincinnati, that city will rank with some of the largest cities in the east in the matter of up-to-date illumination.

Domestic Science Lessons

THE modern method of conducting a course of lessons in Domestic Science will be demonstrated monthly in our magazine.

In this number, Mrs. H. Rose Stewart, author of "Every Woman Her Own Cook," gives the first of a series of lessons and valuable hints in household economy.

A complete course in chafing-dish lessons, camp and invalid cookery, will be consecutively taken up.

We suggest that the reader carefully cull the recipes and insert them in a blank book; in this way a valuable and reliable cookery book may be compiled.

LESSON I.

SOUPS

SOUP MAKING

The foundation of all soup is good stock. The housewife will find a jar of stock made a week ahead a good standby, as various kinds of soups can be quickly made from it.

BROWN STOCK

5 lb. shin of beef, or other meet or bones
2 carrots
1 large onion
1 turnip
A little celery
1 tablespoonful salt
1 teaspoon pepper
A few cloves
4 quarts of cold water

Cut up the meat, place it in a saucepan with the cold water, skim when boiling, then add vegetables and spices, cover closely; simmer four hours.

PUREE DE TOMATOES

1 quart stock
1 tin tomatoes
1½ oz. flour
2 oz. butter
½ pt. cream
Salt and pepper

Boil together the stock and tomatoes for 15 minutes. Rub them through a sieve. Melt the butter in a saucepan, stir in the flour, add by degrees the strained stock, and stir over the fire till boiling. Boil two minutes, allow the boil to go off, then add cream—after which the soup must not boil again.

CLEAR SOUP

1 quart stock
1 gill sherry
Whites and shells of two eggs
Pepper and salt
A few pepper corns and cloves

Place the stock and seasoning in a saucepan—if jelly, stir over the fire until dissolved—beat the whites and shells of egg with a little cold water, add them to the stock and whites till boiling, draw on one side and simmer slowly ten minutes, when it should be strained through a towel and the sherry added.

GREEN-PEA SOUP

Shell one quart of green peas, and put the husks and peas together into three pints of water, to which add a small bunch of fresh mint, two tablespoonfuls of butter, one teaspoonful of salt, one-half teaspoonful of white pepper and three small onions. Boil until the peas are soft, then remove the husk, and press the peas through a colander. Return to the water, add a lump of white sugar, and stir until it boils. Serve with small dice of toasted bread.

OYSTER SOUP

Put on one quart of oysters in their own liquor, and as soon as the beards part take out the oysters and lay them aside. Rub together two tablespoonfuls of butter and one of corn-starch or flour; add to this one egg well beaten, and one pint of milk that has been warmed. Stir together until quite smooth, and pour gradually into the liquor. Stir until it thickens a little, then add salt and pepper to taste. Return the oysters to the soup to be heated, and pour all into the tureen together. A few celery seeds can be added to the liquor when first put on if the flavor is liked. This is the recipe used on York River, where the finest oysters are to be found.

CHICKEN SOUP

Cut up a nice plump chicken, and put over the fire in two quarts of water, with pepper, salt, a tiny pinch of cayenne pepper, and one small onion stuck with six cloves. Boil until reduced to one quart, then take out the chicken, and cut into very small pieces. Have ready one teacup of warm milk, two eggs well beaten and to tablespoonfuls of fresh butter creamed with one teaspoonful of flour. Pour the milk on the eggs, add the butter and flour, and when smooth add to the soup. Let it boil up once, carefully stirring all the time. Return the chicken to the soup, and just before taking it from the fire add some fresh parsley and thyme chopped very fine.

CLAM SOUP

20 clams
2 quarts water
2 tablespoonfuls butter
2 tablespoonfuls flour
1 pint of rich milk
2 eggs
1 small bunch of fresh parsley

Wash the clams (which are best bought in the shells) very clean with a stiff brush. Put them into the water while it is quite warm; as it comes to a boil they will open. Take out each one with a large spoon, and have a linen towel to hold them in, as they are too hot to take in your hand. Hold them over the water, and as the shell opens remove each clam with a sharp knife, and drop them back into the water. Be careful not to waste a drop of liquor. Beat the eggs, and add to them the milk, which must be warm. Add salt and pepper to taste. Take out the clams and chop fine. Let the soup boil up once, and just before serving add the parsley, chopped fine.

CREAM ASPARAGUS SOUP

Carefully scrape and cut one bunch of asparagus into pieces an inch long, and put it on to boil in one and one-half pints of water, to which add one teaspoonful of salt. When the asparagus is done, add to the water one pint of rich milk, one beaten egg, one tablespoonful of butter and one of cornstarch, rubbed together. Boil a few minutes, and serve very hot with small squares of toast.

WHITE SOUP

Take the carcasses of two chickens or the carcass of one turkey. Break the bones, and add to them one small white onion stuck with six cloves, one large bunch of celery cut into small pieces, and boil in one quart of water until reduced to one pint. Strain carefully. Have ready two boiled potatoes, which must be pressed carefully through a sieve, and have two tablespoonfuls of butter rubbed into them while hot. Pour over them one quart of hot milk (not boiling), then add the broth from the bones, etc., and return to the fire. Let it boil up once. After it is put in the tureen add one tablespoonful of finely chopped fresh parsley. This soup is fine.

SOUP A LA BONNE FEMME

1 pint stock
A little watercress
The heart of one small lettuce
The yolk of one egg
1 gill of cream

Shred the watercress and lettuce and cook five minutes in the stock, beat the egg, add to it the cream and a little of the stock, pour all into the saucepan and stir over the fire until it begins to thicken.

FISH SOUP

2 lbs. of raw fish
1 tablespoonful of parsley
1½ oz. butter
½ oz. rice flour
½ pint milk
1 quart water
Pepper and salt.

Boil together bones and skin of fish and water one-half hour. Strain, melt butter in saucepan, add flour, then stock and milk, also fish cut into small pieces, and cook ten minutes.

Authorized Additions and Improvements

ALAMEDA COUNTY DISTRICT: A series multiple street lighting system will be installed at Newark.

CHICO DISTRICT: Replacement of 3″ W. I. Pipe with 4″ C. I. pipe on Main Street, from 6th to 9th, has been completed.

FRESNO DISTRICT: Work covering replacement of 10 blocks of old W. I. L. P. pipe with 4″ C. I. L. P. has been commenced.

MARYSVILLE POWER DIVISION: Work has been started on ten miles of 2300 volt line from Wheatland Substation to supply service for pumping purposes at Harding Tract sub-division.

Extension of lines in Sutter County to supply Sutter City.

OAKLAND POWER DIVISION: Work has been commenced on installation of 3-30 K. W. single phase regulators in Berkeley substation.

Arrangements are being made for installation of 6 single phase automatic regulators at Stations A and B.

Work has started on installation of a steam heating system in central part of Oakland.

OAKLAND DISTRICT: Steel frame extension to our present generating building at station "B" to cover No. 5 machine.

Extension of gas service to tract known as Rockridge Park has been commenced.

REDWOOD DISTRICT: Installation of 6 single phase automatic induction regulators in San Mateo substation.

SACRAMENTO DISTRICT: Arrangements are being made for the re-building of Sacramento carhouses and shops.

SACRAMENTO POWER DIVISION: Arrangements are being made for installation of a 100 K. W. I. R. T. regulator in substation.

SANTA ROSA DISTRICT: Work has been commenced on extension of 2 phase circuit to connect 75 H. P. motor at Peter's Springs.

SAN JOSE POWER DIVISION: A 300 K. W. Motor generator set will be installed at San Jose to take care of increased load. An office building has been erected on substation lot for use of Division Superintendent. Extension of 11 K. V. line to connect San Jose Water Co.'s pumping plant has been commenced.

SAN FRANCISCO: Work has been commenced on extension of gas service to supply Sunnyside, Mission Terrace and Excelsior Homestead Districts.

Arrangements are being made for the installation of 2 additional 12′ scrubbers at Potrero Gas Works.

Cooking a Dinner for Eighteen on an Electric Range

Electrical World, Sept. 29, 1910.

A dinner was electrically cooked for 18 persons at the Electric Shop of the Commonwealth Edison Company at Chicago. The dinner was served to a force of the sales department and guests, partly as a demonstration of the working on an electric range on the fireless-cooker principle made by the Hughes Electric Heating Company of Chicago. The consumption of energy for the different elements of the dinner was a follows:—

	WATT HOURS
Consomme	176
Roast beef	1,318
Lima beans	196
Potatoes	219
Short cake	146
Coffee	215
Total	2,310

The meal was cooked in two hours' time, with a consumption of electrical energy of 1.28 watt hours per person. Figuring this on a basis of 10 cents per kilowatt-hour, the cost for cooking was 1.28 cents per person. In most of the cooking the latent heat was utilized.

Pacific Gas and Electric Magazine

PUBLISHED IN THE INTEREST OF ALL THE EMPLOYEES
OF THE PACIFIC GAS AND ELECTRIC COMPANY

JOHN A. BRITTON - - - - - - - Editor
A. F. HOCKENBEAMER - - - Business Manager

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The Pacific Gas and Electric Company desires to serve its patrons in the best possible manner. Any consumer not satisfied with his service will confer a favor upon the management by taking the matter up with the district office.

Vol. III AUGUST, 1911 No. 3

EDITORIAL

A Citizen of the United States has, by reason of the elective franchise granted him, a duty to perform which should not be avoided under any protest or excuse. This duty is to voice at the polls, by his vote, his expression upon laws to be made and on the fitness or unfitness of applicants for office, and to that end he should see to it that he is enrolled as a voter in order that he may give expression by his ballot to his personal views. Before that time, he should carefully and fully seek out all channels of information which will guide him in his course of action, and should make it his duty to attend meetings held, at which meetings the principles of the aspirants for office are expounded, and explanations given from both sides of the probable effect of the laws to be submitted to the voters which will change the tenor and meaning of the Magna Charta of his State, or the charter of his city.

Too often in the history of elections has the will of the minority of voters prevailed over the will of the majority, due wholly to the apathy and indifference of men who do not take advantage of their rights as citizens.

The being of a good, honest, upright man, a moral force in his community, a respecter and observer of the laws, does not constitute all of a citizen. He is charged with a responsibility that cannot be shirked, that of being a party to the making of laws, to the advancement of the welfare of his State, and to the placing of good men and true in office, that rises superior to any other duty that the laws of God or man impose upon him.

A government by the people is only as good, as pure, as righteous, and as honorable as are the people themselves, and if the masses of men neglect the opportunity given them to create a government, whether local, State, or national, one particle, and are depreciated in moral worth, then the burden rests upon the shoulders of those who neglect their duties, for in the eternal fitness of things the majority of men and citizens stand for and represent the best elements of men, and if the government of the people does not reach the higher standard of perfection, then the majority has itself to blame for failure to do those things which it has the right and power to do.

The coming election for city and county officers, and the constitutional amendments to be submitted to the people, are of such grave importance that every man entitled to vote should see to it that he is enrolled on the register, and should further see to it that he exercises his right as a citizen at the polls.

The following letter from Mr. H. P. Pitts, Industrial Engineer, to Mr. L. H. Newbert, Manager Redwood District, March 2d, 1911, is published in its entirety, as containing valuable information and suggestions to those who may have similar troubles in their territories.

Dear Sir:—

Following our conversation with reference to the trouble which is being experienced with the several small pumps being operated by single phase motors in your territory, will say:

I have interviewed the pump manufacturers with a view of determining whether or not a double or triple acting pump could be used in these wells, and was informed that it would be practically impossible on account of the wells not being bored large enough, so that we will have to do what we can to remedy the operation of the single acting pump as it is.

It is doubtful whether or not these pumps have air chambers. If not, the one remedy is in attaching air chambers to the discharge pipes.

Without having seen the pumps, I have tried to imagine the type of pump used, and have made a pencil sketch which is herewith enclosed. Such an air chamber as shown would be very inexpensive, and could be made from a length of 6 or 8-foot 6-inch casing threaded at both ends and using a stock cap at the top and a stock reducing flange at the bottom, reduced to take a 3-inch nipple, which nipple would be screwed into a 3-inch T placed in the discharge.

There is no doubt but that this would make the motor run more smoothly, but I have my doubts whether or not it would help the starting of the motor. If, after the air chambers are in place, there is still the difficulty in starting, tight and loose pulleys could be used, and I am informed that there is room within the frame of the pumps for an additional loose pulley, which would be belted from a pulley on the intermediate shaft. Sketches of this layout are not necessary, as I believe you suggested the tight and loose pulleys yourself while discussing the matter.

In placing this air chamber in the discharge pipe, care should be taken to have it far enough away from the pump so that, in case it becomes necessary to repair the pump, the pinion and shaft could be withdrawn so as not to interfere with the air chamber.

If this change is made I should be pleased to know just what the results are.

A very interesting article appeared in the March, 1911 number of the Pacific Gas and Electric Magazine, written by Mr. Frank B. Anderson, and entitled "Morals in Trade and Commerce," and which was delivered by Mr. Anderson in the form of a lecture, before the students of the University of California, Berkeley, under the "Barbara Weinstock" foundation.

A relatively companion booklet by Albert Shaw, Ph. D., entitled "The Business Career" along the same lines may be secured from Paul Elder & Co., San Francisco.

Out Door Lighting in England

By N. H. HUMPHREYS.

American Gas Light Journal, Oct. 10, 1910.

The following facts are given to show how successfully gas is competing with electricity in out-door lighting in England.

In London, Westminster is saving $40,000 a year by using gas rather than electricity, the streets in which gas is superseding electricity being Regent Street, Picadilly Circus, St. James Street, Pall Mall, Waterloo Place, Shaftsbury Ave., and Coventry Street. The city of London has adopted gas lighting in Fleet Street, Queen Victoria Street and elsewhere. The various bridges across the Thames are lighted by gas instead of electricity, as are also the whole of Aldwich and Kingsway.

In the city of London there are 3 public gas lamps to 1 electric; in Perth, 11 gas to 1 electric; in Glasgow, 22; in Dundee, 62; in Aberdeen, 20; in Edinburgh and Leith, 9; in Manchester, 220; in Bradford, 141; and in Liverpool, 122. In Hackney, Tottenham, Melton, Mowbray, Woking and Lanrwst, Beckenham, Brentford and Acton, gas either has replaced electricity or contracts have been made to this effect.

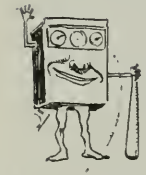
Among the Continental cities, the Berlin Council decided to spend $1,500,000 in installing modern gas lighting and throwing out all existing electric lamps. In Brussels there are 29 gas street lamps to 1 electric lamp; in Cologne and Dresden, 25 to 1; Vienna, 19 to 1; Munich, 9 to 1; and in Dusseldorf, 5 gas to 1 electric lamp.

Pacific Wins Annual Game and the Series

Wallop San Francisco Team by Juicy Score of 19 to 8

By EUGENE A. BEAUCE.

I want to go to the ball game,
I'm the fall dame for a ball game,
'Tween the P. G. E.—S. F. G. E.,
I'll root and hoot and shout,
I want to go to the past time,
Have a fast time like the last time,
See Wise swat the flies,
Butler strike out those guys,
And Bostwick fan out.

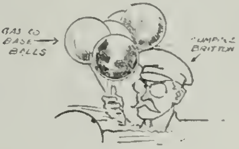


Thus sang one of the feminine divinities on the payroll of the company to her handsome escort, who is engaged in the same pleasant occupation, the occasion being the annual baseball game between the heads of the departments of the Pacific and San Francisco Gas and Electric Companies. The big event was pulled off at St. Ignatius College grounds on Saturday, July 22, 1911, and—curses on the luck!—the Pacific team won by a score of 19 to 8, making it the best two out of three. Downing's prophecy at last year's banquet that there was hope for the Pacific team this year because J. D. Butler, like Roosevelt, would not come back the third time, had come true.

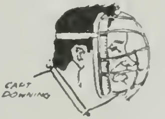
A goodly crowd was in attendance, and was well rewarded by witnessing now and them some flashes of ball playing that partook of the big league flavor, though now and then some of it might have been of the yellow-hued variety to a dyed-in-the-wool fan.

John A. Britton must positively be the bravest man living, for he once more had the temerity to face, as umpire, a maddened throng, which every now and then threatened him with dire vengeance for giving decisions that did not please, for the simple reason that

they were O. K. Instead of carrying out their threats, however, the aforesaid maddened throng contented itself with chewing gum or munching peanuts, at intervals. San Francisco won the toss, and choosing the field—Pacific went to bat. Wise and Wilson hit safely, while Captain Downing fell for a slow out-curve and struck out. Thompson likewise fell all over Caine's grounder, and the hits of Henley and Lisberger resulted in a total of four runs for Pacific—think of it, four, just to start something. In San Francisco's half, Varney's long fly to left was hooked by Wise, who repeated the offense by assimilating Oldis's drive down left field line in a great running catch.



"He eats 'em alive," shouted an enthusiastic Pacific rooter, and the word was passed around to San Francisco that there was a ringer in left, and to hit them to center. Instructions were followed. Wise got no more put-outs, and Bostwick fanned the ball (and himself), for he was beginning to get warm. In the second, Cantrell landed on a drop ball for two bases. Wise scored him with a single, and Wilson sent a hot liner to Bostwick, who made a fast double play to Thompson. Downing got life on Bostwick's error, and working around to third was caught sleeping there, and woke up a sadder, but wiser, man.



In San Francisco's half, Cunningham struck out, and Pitts gracefully succumbed to three wide ones. The score was now 5 to 0 in favor of Pacific, and it was noticed that the San Francisco rooters were rather quiet and chewed more peanuts and gum. Butler warmed up in the third, and putting all the vim developed by early morning walks before breakfast into his pitching arm, secured two assists, and Newbert went out like a man between acts. Caine, after walking, and stealing second and third, took a short nap, Varney waking him up as he had done to Downing in the second.

Keppelmann hit safely, and Thompson singled. Butler jumped into the breach and planting the ball on infield where it took root, scored "Kepp" and was himself safe at first. San Francisco's first run, and the din of her rooters became terrific, for was not Butler on the job again? Varney was hit by a pitched ball, filling the bases.

Oldis lined out to Lisberger, who doubled Varney at first. Bostwick, who likes to walk occasionally, did so, with proper dignity, and Cunningham, with thoughts of a new contract yet to be procured, popped to Lisberger for the third out. Thompson must have been day-dreaming about a long-lost love or something, for while he was anchored at third he absolutely refused to go home on more than one occasion. Some one said he never went home until after everybody else went, while others said he thought the ball had to go over the fence before he would be allowed to come in.

CHIEF WHITE.
TRIED TO GIVE
THE S. F. GAS CO.
A HOME RUN IN
RETURN FOR
HIS POLICE BADGE'

In the fourth, Lusk arrived safely at first on an error, only to be doubled on Cantrell's liner to Thompson. Oldis evened up with Wise by capturing the latter's fly at left.

White presented a broad side to Lusk, and was hit in a vital spot by a pitched ball, taking first. Pitts was out at first on Lusk's throw to Newbert. Keppelmann singled, Thompson went out (second to first), and Butler laid down on a fielder's choice, White scoring. Butler was safe at first, and the mighty Varney hit to right. High above the din of the San Francisco rooters, Captain Downing's voice was heard calling to Caine, who was counting the stitches in the ball in right field, while San Francisco's score was piling up. Oldis hit safely, Lisberger tripped and fell down on Bostwick's grounder. Cunningham, who is very fond of chickens, wrens, squabs, and other fancy poultry, fouled out. Result, score tied, 5--5, and pandemonium, whatever that is, reigned supreme among the bleachers, both blonde and brunette.

San Francisco took the field in the fifth with a determination to do or die, and they did—die, for they were wiped clean by Pacific, just like the janitors wipe up the company's offices. Wilson hit for three bases, but Butler, again using some of his hypnotic powder, put him in a trance and threw him out with Varney's help. Then the unexpected happened. Hit followed hit, error piled on error, and then some, and Pacific scored six before the side was retired. It was what might be called an orgy of runs, in fact, a regular jag of the same, and the "Green Ink Refund" had nothing on it for nerve-racking results. Lusk was relieved by Caine, as the San Francisco batters were getting their eagle eye on the ball too. Caine walked White and Pitts, both came home, making it 11—7, still in Pacific's favor.

In the sixth, Newbert struck out. Caine, who is something of an aviator, when he is not concocting magazines, flew out to Oldis, and Lisberger went out (first to second), making it three outs for luck. Varney made a hit for San Francisco, but having a couple of kinks in his limbs, Cunningham ran for him and was caught between second and third. Oldis hit a two-bagger, and in rounding second made a terrific slide for life and third, and when he stopped short he was put out by a short stop, Wilson by name. Bostwick walked, and Gurnett struck out.

After that, Official Scorer "Jim" Wrinkle, who has materially assisted in these chronicles, lost all track of the game, except the score, which is already known. And why continue the harrowing tale?

Just before the last inning, Mr. Britton, in an appropriate speech, presented Chief White with a beautiful diamond-studded gold badge of office, the gift of the latter's many friends in the company's service. When White was called upon to respond, he waved his hand and said: "Watch me make a home run." And did he not make a home run?" Yes, he did—not.

Captain Downing, at the dinner given the players the evening following the game, divided honors with Mr. Al Trowbridge, the official coach for the Pacifics, and who deserves a great deal of credit for his perseverance and generalship in rounding the team into shape. The score:—

Pacific Gas and Electric Company

	A. B.	R.	B. H.	A.	P. O.	E.
Cantrell, R. J.	6	2	1	2	1	0
Wise, J. H.	6	2	2	0	2	0
Wilson, C. J.	6	2	4	1	1	0
Downing, P. M.	5	2	1	2	7	0
Henley, E. B.	5	3	2	0	0	0
Newbert, L. H.	4	2	1	0	6	0
Caine, A. H.	4	2	1	4	0	1
Lisberger, S. J.	5	2	3	4	4	1
Lusk, C. H.	2	2	0	2	0	0
Bridges, M. H.	3	0	0	0	0	0
Totals............	46	19	15	15	21	2

San Francisco Gas and Electric Company

	A. B.	R.	B. H.	A.	P. O.	E.
Varney, F. H.	4	1	2	0	3	4
Oldis, F. E.	4	0	2	0	2	0
Bostwick, H.	2	0	0	3	1	3
Cunningham, J.	2	0	0	0	0	0
White, D. A.	1	2	0	0	6	0
Pitts, H. P.	2	2	0	0	0	0
Keppelmann, D. E. ...	3	2	2	0	6	3
Thompson, A. R.	4	0	1	3	2	5
Butler, J. D.	2	1	0	8	0	1
Gurnett, A. J.	2	0	0	0	1	0
Totals............	26	8	7	14	21	16

SUMMARY.

Two-Base Hits—Cantrell, Wilson, Oldis.

Three-Base Hits—Wilson.

First Base on Balls—Off Butler, 2; Lusk, 1; Caine, 6.

Struck Out—By Butler, 3; Lusk, 3; Caine, 3.

Double Plays—Bostwick to Thompson, Lisberger to Newbert, Thompson to White.

Hit by Pitcher—Varney, White.

The Gas Turbine

Gas World, Nov. 19, 1910.

In the Commercial and Engineering Notes of the Manchester Guardian it is said:—"A Manheim report states that the electrical firm of Brown, Bouverie & Co. will shortly place on the market a gas turbine which will be a satisfactory solution of the problem. They have already constructed, and had running for some time, a 300 horsepower turbine, and are now experimenting with a 1,000 horsepower machine. The new invention is the work of the engineers, Holzwarth and Junghaus, and will be known as the Holzwarth-Junghaus gas turbine. If it should justify the claims which have been made for it, it will be an engineering novelty of the very greatest interest and importance to the world."

A large number of extensions of our distributing lines in Alameda County have been started during the past month. Our service is so well established in this County at the present time, at least in the district from Niles north to Oakland, that it is possible to obtain electric service on nearly all of the main county roads. One of the extensions made is to supply a ten-horsepower motor for operating a pumping plant that will irrigate twenty acres of strawberries. The section down near Niles, where this plant is located, is especially adapted to the growing of berries.

Our duty is to be useful, not according to our desires, but according to our powers.—*Amiel.*

PERSONALS

On July 21st, 1911, a baby girl was born to Mrs. A. H. Burnett, wife of Mr. A. H. Burnett, Superintendent of the South Tower Power Division.

"Jack" Gallagher is Injured in Runaway

"Jack" Gallagher, the well-known meterman employed by the Pacific Gas and Electric Company, was the victim of a bad accident early yesterday afternoon. While driving down the alley between Ohio and Louisiana Streets, a portion of the harness gave way and the horse, becoming frightened, ran away. The buggy was upset and Gallagher was thrown to the ground with great force.

The fall rendered the young man unconscious and Dr. B. J. Koltz, who was summoned to attend him, found that he had sustained a bad scalp wound in addition to a number of bruises about the body.

His injuries, while painful, are not serious.

—*Valleja Times*, July 23.

Mrs. Marie Caroline Beauce, widow of Alexander A. Beauce, and mother of Eugene A. Beauce, of the bookkeeping department of the San Francisco Gas and Electric Company, and Mrs. Arthur L. Duncan, died in this city, August 1st, 1911. The deceased was a native of Alsace, and eighty-five years of age. She first came to New Orleans with her family when she was a child, and afterwards located in this city in 1875. She was one of the most active workers in the Francesca Relief Society of St. Ignatius Church for more than twenty years and until a few years ago, when her physical break-down began as the result of old age. Many have experienced the benefits of her charities and she will be sincerely mourned. Interment took place in the family plot at Holy Cross Cemetery, August 3d, 1911, after a requiem mass at 9 A. M. at the French Church, Bush Street.

Mr. Newbert "Fobbed"

Mr. L. H. Newbert, who was as of July 1st, 1911, transferred to the San Francisco office, as Manager of the Appliance Department, upon leaving as Manager of Redwood City, was presented with a very handsome watch fob by his former employees in that district.

A pleasant surprise was afforded the employees of the San Francisco general office last week, when Mr. F. V. T. Lee, former Assistant General Manager of the Pacific Gas and Electric Company, unceremoniously paid us a visit when he was supposed to be still sojourning in London.

Mr. Lee looks strong and healthy, and still carries with him his genial smile and pleasant mannerisms, which have always endeared him to the employees of the Company.

It had been presumed that Mr. Lee, owing to his long stay in London, had developed into a thorough Britisher. While we naturally supposed that he had been indulging in the regulation British caps, spats and a monocle, he appeared upon the scene much as he had left us, and although he claims to be an Englishman, he is, owing to his long stay in the United States, about ninety-five per cent American.

Business necessitated Mr. Lee visiting Vancouver and other British Columbia points, and being so near San Francisco, he dropped around this way for a few days' visit. He is a member of the Bohemian Club, and has spent several days at the Grove during the midsummer jinks. He is scheduled to leave New York about the 20th of August for the return trip to London.

When They Cut the Lunch Hour Out

By EUGENE A. BEAUCE, Bookkeeping Department,
San Francisco Gas and Electric Company

Don't lose your spirits, Barlow,
Don't worry, fret or pout,
Think of the hardships coming
When they cut the lunch hour out.

No more for coffee and peach pie,
Hereafter you will shout,
Cold tea and bread will be the stuff,
When they cut the lunch hour out.

There's no more indigestion,
Dyspepsia you will rout,
You'll have to lead the simple life,
When they cut the lunch hour out.

No waiter waiting for a tip,
When he serves you sauerkraut,
You can eat a bag of peanuts,
When they cut the lunch hour out.

Of course the nickelodeons,
You'll miss, with all their thrills,
But what enjoyment can compare
With making "Closing Bills?-"

When bills you are comparing,
A red rose on your breast,
Think of the fun you're having,
Sending meters out to test.

There is one consolation,
You'll have no dread of gout,
From eating hash or mutton stew,
When they cut the lunch hour out.

So cheer up! "Old Scout" Barlow,
'Tis true you'll not get stout,
You'll save six-bits a week in board,
When the cut the lunch hour out.

Then pull yourself together,
Let all your sorrows fade,
For you can always wander back
To that dear old Maple Shade. (New Jersey)

In the last issue was reproduced a photograph of Mrs. W. C. Bowman, wife of the foreman at the Deer Creek Power House, and her dog "Septimus."

Mrs. Bowman has again favored the magazine with a portrait of "Septimus" in another role, which we take pleasure in publishing. It is hoped that such habits are not prevalent among the dogs at Deer Creek.

In the June issue, page 17, we published a few lines of poetry, sent in by a prospective consumer in the Oakland District, who was loudly crying for gas. His prayers have been answered, and he has now forwarded to the Oakland office, the following:

WE'VE GOT THE GAS

We waited, watched, and prayed,
And now the pipes are laid.
Now as the years may pass,
We'll be blest with cooking gas.

Clean and neat, quick as a flash,
Good for hot cakes, eggs or hash.
Joyfully the days will pass;
We can cook and fry with Gas.

Don't forget to register before August 26.

QUESTION BOX

Ask questions. Any one of the several thousand men and women in the Pacific Gas and Electric Company who wishes information pertaining to any phase of the company's work or concerning matters of common interest to residents of any section reached by the company's lines is urged to use this department freely. Send your questions to the magazine. There will be no charge.

Question.—Will a centrifugal pump submerged deliver more water (gallons per minute per horsepower) than one located, say, fifteen feet above water level, the discharge being the same? If not, what is the advantage of a submerged pump?

Answer.—No; pumps are submerged only in wells where the height of water in the wells varies and the pumps are located whether submerged or not, so that the suction will not exceed approximately twenty feet.

Question.—When two-phase service is supplied to a motor and the current consumed is measured with two meters, why does one meter often register considerably more than the other, both meters being correct within one per cent?

Answer.—If two-phase, "non-interconnected" service were supplied to an exactly balanced load, and if the voltage on each phase was exactly the same, a single-phase meter on each phase should register the same amount of energy supplied. However, phase conditions are not always the same; the power factor is not unity; and as a result one meter will register considerably more than the other. S. J. L.

Question.—Why does a gasoline engine having overhead valves develop more power than an engine with valves on the side, the cylinders being the same size, that is, having the same stroke and bore?

Answer.—The argument appears to be only from a salesman's point of view. The only difference in horsepower must be the difference in efficiency of the several types of engine. H. P. P.

Question.—Why are high-speed engines generally employed for automobile service? Are they as efficient as low-speed engines?

Answer.—In any engine the horsepower is approximately proportional to the speed and size of the cylinders. The small amount of room allowed engines in automobiles necessitates high-power, high-speed engines. They are just as efficient.

Question.—Suppose a gas meter is reported upon test to be a percentage fast or slow, how should allowances or added charges be correctly computed? It has been the custom, probably because of the simplicity of the computation, to deduct or add the amount of the percentage as the fast or slow condition warrants, to or from one or more bills contracted just prior to the moment of test. It seems as if this were not quite just to the company.

Answer.—It is not; take for example the case of a meter 10% fast. It would not be the fact that if the consumer had paid a $10.00 bill that he had overpaid 10% of that amount, or $1.00. The rebate must be computed upon the basis of $10.00, being 110% of his bill; in other words, the bill rendered must be divided into 110 parts to ascertain the value of one part and that part multiplied by 100 to ascertain the true charge. For example:

$$\$10.00 \div 110 = \$0.0909 \times 100 = \$9.09,$$

the true bill, calling for an allowance of 91 cents instead of the $1.00 arrived at by the offhand method.

The same procedure holds good in calculating slow tests. If a meter tests 10% slow and the bill is $10.00, the company would lose a second time if it charged the consumer 10% of $10.00 or presented him with an $11.00 corrected bill. The $10.00 in this case is only 90 parts of his true bill and the calculation should take on the following characteristics:

$$\$10.00 \div 90 = \$0.1111 \times 100 = \$11.11,$$

showing $1.11 as an additional amount to be paid the company, to effect a correct billing, instead of the dollar arrived at by the easier though more careless operation.

PACIFIC GAS AND ELECTRIC COMPANY

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THE PACIFIC GAS AND ELECTRIC COMPANY

SUPPLIES HEAT, LIGHT AND POWER TO

Place.	Population.
Agua Caliente	50
*Alameda	23,383
**Albany	800
‡Alta	200
Alto	30
Alvarado	200
Allegheny	200
‡Amador	200
Angels Camp	3,200
Antioch	3,000
‡Auburn	2,376
Baden	1,500
Barber	200
**Belmont	600
Belvedere	481
Benicia	3,360
Ben Lomond	800
**Berkeley	40,434
Bethany	200
Big Oak Flat	150
Biggs	750
Black Diamond	500
Bohemian Grove	25
Brentwood	200
Brighton	100
Broderick	500
‡Brown's Valley	50
**Burlingame	5,000
Byron	200
Campbell	1,000
Camp Meeker	200
Cement	1,500
Centerville	500
‡Centerville	20
**Chico	13,000
Chittenden	50
**Colusa	1,582
‡Colfax	400
**Colma	500
Concord	1,500
Cordelia	150
Corte Madera	350
Cordova	25
Cornwall	300
Crockett	2,500
Crow's Landing	375
Davenport	1,000
‡Davis	750
Decoto	350
‡Dixon	1,000
Dobbins	50
‡Drytown	100
Duncan Mills	150
Durham	500
‡Dutch Flat	400
Eagle Nest	50
‡East Auburn	1,500
**Easton	500
**East San Jose	1,500
Eckley	20
Eldridge	1,000
‡Electra	50
Elmira	150
El Verano	100
Emerald	50
**Emeryville	2,000
Encinal	20
Fairfax	250
Fairfield	800
**Fair Oaks	250
Felton	300
Folsom	1,500
Forestville	100
*Fresno	24,892
Gilroy	2,000
Glen Ellen	500
‡Gold Run	100
Grafton	350
†Grass Valley	4,520
Gridley	1,800
Groveland	50
Guerneville	500
Hammonton	500
**Hayward	4,000
Hollister	3,000
Ignacio	50
‡Ione	900
Irvington	1,000
‡Jackson	2,035
‡Jackson Gate	50
Kennedy Flat	50
**Kentfield	200
Knight's Landing	350
Larkspur	594
Lawrence	100
‡Lincoln	1,402
Live Oak	200
Livingston	200
Livermore	2,250
‡Loomis	150
Los Altos	200
Los Gatos	3,000
Manlove	50
Mare Island	500
‡Martell	25
Martinez	5,000
**Marysville	5,430
Mayfield	1,500
Mayhew	50
**Menlo Park	1,500
Meridian	300
Middle River	75
Mill's College	150
**Milbrae	300
Mills	350
Mill Valley	2,551
Mission San Jose	500
Mokelumne Hill	150
Monte Rio	50
Mountain View	2,500
**Napa	5,791
Napa Junction	250
†Nevada City	2,689
Newark	700
‡Newcastle	600
New Chicago	25
Newman	1,000
Niles	800
Novato	250
**Oakland	225,000
**Oak Park	8,000
Occidental	400
Ophir	50
Oroville	2,500
Orwood	50
Oswald	25
Pacheco	200
**Palo Alto	6,000
Patterson	100
Penon Blanco	25
‡Penryn	250
Perkins	200
**Petaluma	5,880
**Piedmont	2,000
Pike City	200
Pinole	1,500
Pleasanton	2,000
Port Costa	600
**Redwood City	3,500
**Richmond	6,802
Rio Vista	884
‡Rocklin	1,026
Rodeo	100
‡Roseville	2,608
**Ross	556
Routier	30
***Sacramento	52,000
San Andreas	200
**San Anselmo	1,531
**San Bruno	1,500
**San Carlos	100
**San Francisco	416,912
**San Jose	40,000
San Juan	150
**San Leandro	4,000
**San Lorenzo	100
**San Mateo	7,000
San Pablo	1,000
**San Quentin Prison	1,600
**San Rafael	5,934
Santa Clara	8,000
Santa Cruz	11,146
**Santa Rosa	7,817
Saratoga	200
Sargent	50
Sausalito	2,383
**Sebastopol	1,233
Selby	100
Smartsville	300
Sonoma	1,200
**So. San Francisco	2,500
Stanford University	2,000
**Stege	100
‡Stockton	23,253
Suisun	1,200
Sunnyvale	2,000
‡Sutter Creek	2,000
Terminus	50
Tiburon	100
Tormey	150
†Towle	200
Tracy	1,200
Vacaville	1,177
**Vallejo	11,340
Vallejo Junction	10
Vernalis	50
Vineburg	200
Walnut Creek	350
Warm Springs	200
Watsonville	4,446
Wheatland	1,400
Winters	1,200
**Woodland	3,187
Yolo	350
**Yuba City	1,160

*—Gas	48,275
**—Gas and Electricity	847,139
‡—Electricity and Water	41,445
***—Gas, Elec. and Street Car Service	52,000
†—Electricity, Gas and Water	7,409
Unmarked—Electricity only	113,607
	1,109,875

Service Furnished.	Number of Towns.	Total Population.
Electricity	204	1,061,166
Gas	52	946,328
Water	20	42,894
Street Car	1	52,000

EMPLOYS 3,500 people

OPERATES 11 hydro-electric plants in the mountains
8 steam-driven electric plants in big cities
18 gas works

SERVES ⅖ of California's population
30 of California's 56 counties
An area of 37,950 square miles
¾ the size of New York state
½ the size of all the New England states combined

PACIFIC GAS AND ELECTRIC MAGAZINE

Published Monthly by
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO

VOL. 3 ◆ SEPTEMBER, 1911 ◆ NO. 4

IRRIGATION CANALS, PLACER WATER DISTRICT

SAN FRANCISCO "1915" THE EXPOSITION CITY

ASSOCIATED OIL
COMPANY

GENERAL OFFICE
Wells Fargo Building
San Francisco

Telephone Kearny 4800

FOR SALE.

The Pacific Gas and Electric Company has for sale the following machinery:

ENGINES

MAKE	H.P.	COMPOUND	CYLINDER	STROKE	RPM	PRESSURE	FLY WHEEL	CONDENSER
Ball	185	Tandem	12"-20"	16"	250	115 lbs.	74" D 15" F. Belt	Surface
Ball	350	Tandem	18"-28"	18"	208	120 lbs.	86" D 17" F. Belt	Surface
Ball	150	Cross	13"-22"	12"	300	125 lbs.	75" D 17" F. Belt	None
Hamilton-Corliss	450	Tandem	22⅜"-42⅞"	48"	75	110 lbs.	22' D 1½" Rope 14 Grooves	Surface
McIntosh-Seymour	400	Tandem	15"-30"	36"	136	155 lbs.	12' D 1¼" Rope 24 Grooves	Surface
S. F. Tool Co	150	Vertical Triple Ex.	15"-22"-24"	24"	140	140 lbs.	14' D 1¼" Rope 27 Grooves	None
Westinghouse	75	Cross Vertical	10"-14"	12"	350	125 lbs.	75" D 15½" F. Belt	None
Ball & Wood	700	Cross Vertical	21½"-45½	20"	150	155 lbs.	Direct conected to Gen. Elec. Co. Rev. Field Generator 500 K.W. 3 phase 2300 volts 60 cycles	Surface

BOILERS

One Heine Water Tube Boiler—200 HP., 135 lb. pressure, 87 tubes 3½" x 16'.

For further information and prices, kindly communicate direct with Mr. GEO. C. ROBB, Superintendent of Supplies, 445 Sutter Street, San Francisco.

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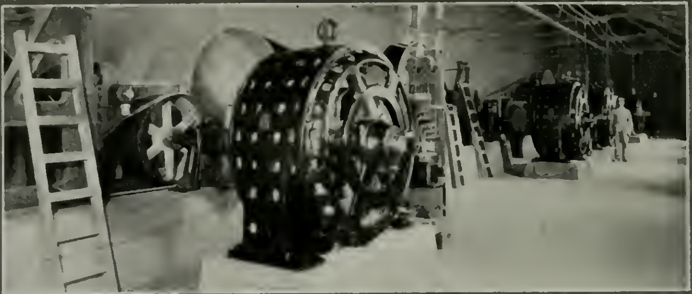
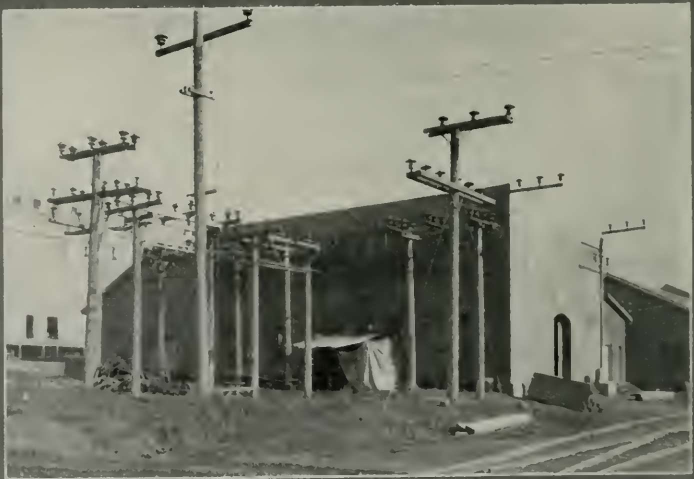
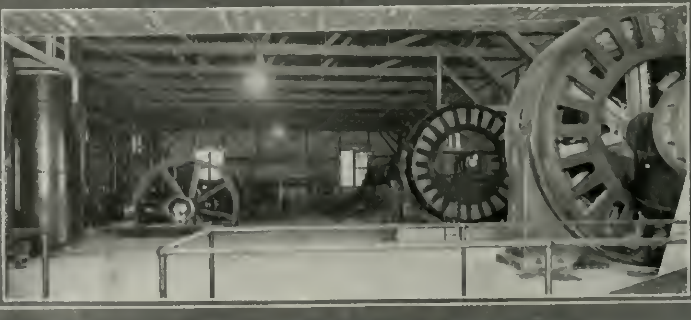






Motors in Finishing Mill, Santa Cruz Portland Cement Co., Davenport, Cal.

Substation in which are located the Pacific Gas and Electric Company's Transformers and other Apparatus for supplying this plant

Motors and Compressors in the Davenport plant

PACIFIC GAS AND ELECTRIC MAGAZINE

VOL. III SEPTEMBER, 1911 No. 4

Portland Cement Manufacture

General Process of Portland Cement Manufacture at the Santa Cruz Portland Cement Company's Plant, Davenport, California

By LLEWELLYN T. BACHMAN, Chemist.

LOCATION AND GENERAL INFORMATION

THE Santa Cruz Portland Cement Company's plant is located at Davenport, California, ten miles northwest of Santa Cruz, directly on the coast. It is reached by the Southern Pacific and Ocean Shore railroads from Santa Cruz. Deep water shipping facilities are obtainable at a distance of about 1,000 feet from shore.

The plant area covers about sixty acres, and has been in operation since April, 1907. The company's holdings, on which are located deposits of limestone, clays and shale, constitute over 2,000 acres. All buildings are constructed of concrete and steel.

In this description of the plant's processes and accompanying drawings and photographs, the reader interested in the manufacture of portland cement will observe many improved and economic features in the arrangement of its machinery and the handling of its materials. (See drawing next page.)

LIMESTONE QUARRY

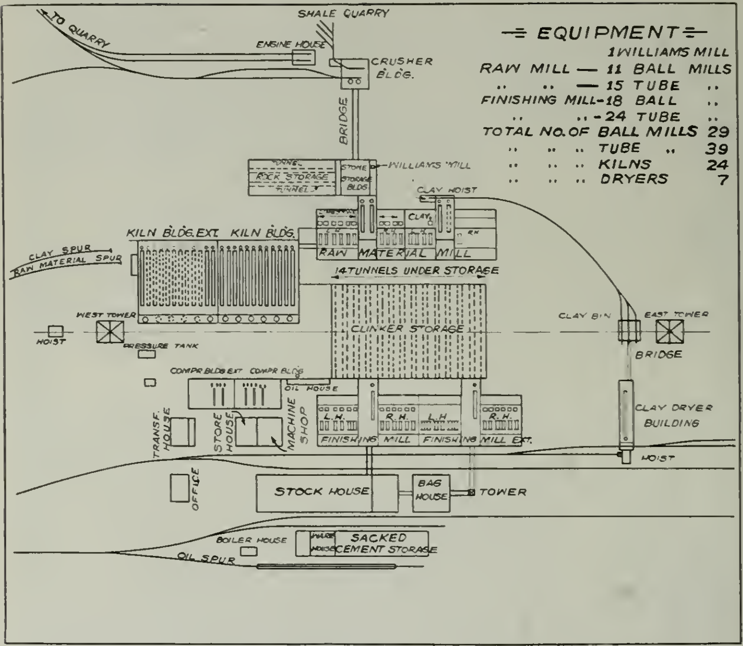
The materials from which cement is manufactured are limestone, clay and shale.

The limestone is quarried from enormous deposits in the San Vicente Canyon, at a distance of two and eight-tenths miles from the plant. The floor of the quarry was formed by blasting down the limestone on both sides and filling up the canyon to a depth of 85 feet. The precipitious cliffs rise on both sides from 300 to 500 feet from the quarry floor level. The quarry floor now covers an area of about 1,000 feet in length and 150 feet in width, and is maintained in two working levels.

At the entrance to the quarry a heavy structure 80 feet in heighth is thrown across the canyon, which forms the bins for the crushed limestone. In this structure a large No. 9 Gates gyratory crusher, operated by a 150-horsepower motor, is mounted on a massive concrete foundation at an elevation of 70 feet, which discharges its crushed product into these bins. The rock from the quarry is delivered to the crusher by means of Flory and Lidgerwood hoisting and cable apparatus and by three ton cars on narrow gauge tracks. The daily output from the quarry varies from 1800 to 2200 tons of limestone. (Illustration No. 1.)

CLAY QUARRY

The clay, which is of a high aluminous character, is obtained from the company's deposit, sixteen miles north of Santa Cruz, at Tank Siding. About 190 tons are consumed per day.



Sketch of Lay-out and Equipment of the Davenport Plant

SHALE QUARRY

This deposit of diatomaceous shale is located directly back of the crusher building. Owing to its high silicious character, this shale cannot be practically used for cement without an addition of an aluminous clay. When the clays which constitute the light overburden and narrow seams in the limestone quarry are of higher or lower silicous content, the clay and shale is varied in proportionate amounts to preserve a constant silica-alumnia ratio in the raw composition. It is found that a three component mix is therefore a very flexible and favorable method for formulating a constant mixture.

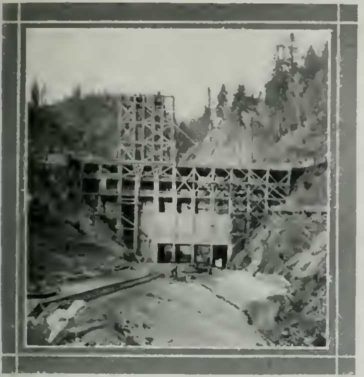
ROCK TRANSPORTATION

The limestone is transported from the quarry to the plant in trainloads of eight cars of 20 tons each, over a standard gauge track constructed along the west side of the canyon. The equipment consists of steel side dump cars of 20-ton capacity, and two 40-ton Porter locomotives (Illustration No. 2.)

CRUSHER BUILDING AND ROCK STORAGE

The cars containing the limestone are run over track scales to check the gross tonnage, from which the cars are dumped and the limestone discharged into two No. 6 Gates gyratory crushers operated by one 150-horsepower motor. This constitutes the second reduction. (Illustration Nos. 3 and 4.)

The two crushers are so arranged to discharge their product onto one 24-inch 15-degree inclined belt, 200-feet centers, which conveys the product into a rock storage capable of holding 16,000 tons. Three belts



No. 1 Rock Bins at Quarry

with three Robins automatic trippers serve to distribute the crushed limestone over the rock storage area. By means of a system of tunnels and belting, the limestone is drawn out from underneath the rock storage onto a cross belt into two 6-foot x 60-foot dryers. From the discharge end of the dryers, the limestone is elevated into a bucket conveyor which delivers the material into the Ball mill bins. All bins are of a steel, hopper type, construction. At the same time, the clay and the shale is dried through similar dryers, and their discharge delivered into Ball mill bins.

No. 3 Crusher Building and Locomotive Round House

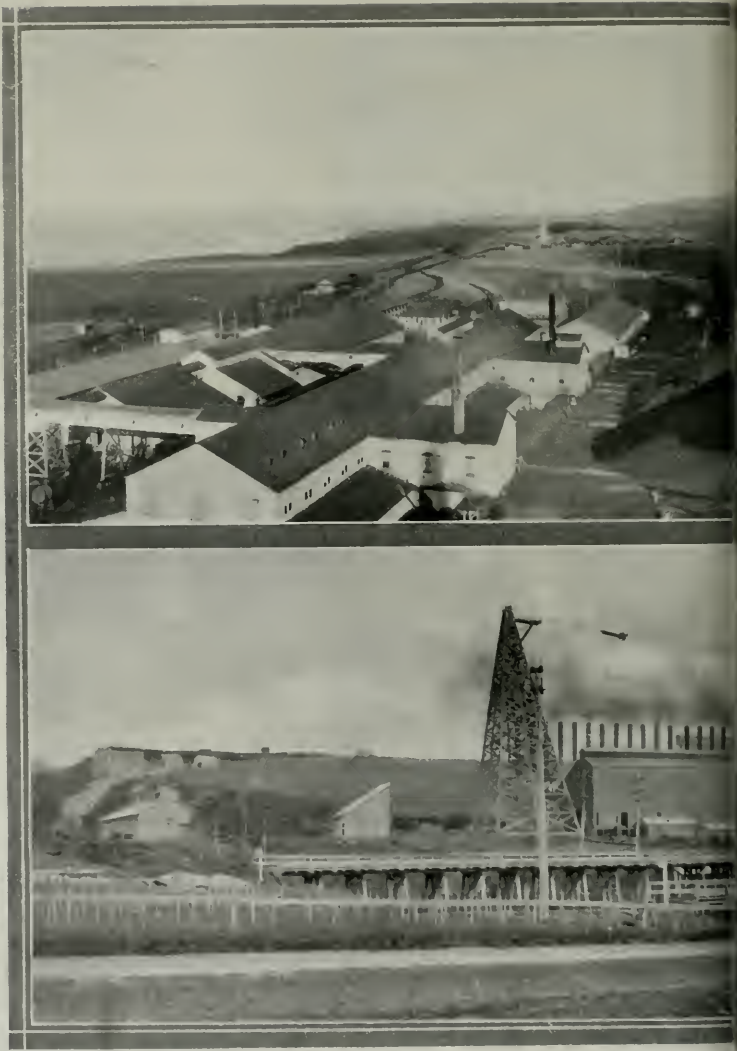
RAW MILL BUILDING

A third reduction is accomplished through eleven Gates No. 8 ball mills for limestone, clay and shale, each of which is ground separately and their product elevated and conveyed into separate bins; six for limestone, and three, each of different capacity, for clay and shale. Automatic samplers are arranged for sampling each of the three raw materials while their respective bins are filling. When these samples are analyzed and a raw composition formulated in the laboratory, the three separate materials are drawn out simultaneously into a battery of three automatic weighing machines, which again simultaneously discharge into a huge double-screw-cut flight mixer. From the mixer the raw composition is elevated and conveyed into the tube mill bins.

No. 2 Train Load of Limestone

The tube mills giving the final grinding to the raw composition are of the Gates $5\frac{1}{2}$-foot by 22-foot type and are fourteen in number, operated in pairs by a 250-horsepower motor. The tube mill product, 73% of which passes

No. 4 Crusher Building



BIRDSEYE VI

SANTA CRUZ PORTL

THE UPPER PICTURE WAS TAKEN FROM THE

LANT OF THE

ENT COMPANY

E. SHOWN ON THE RIGHT IN THE LOWER VIEW

Interior of Kiln Room

a 200-mesh screen, is discharged into one long continuous screw conveyor, where the raw composition is again automatically sampled and checked from the laboratory. The raw composition is then elevated and conveyed to the kiln bins.

KILN BUILDING

By a large margin, this is the largest building in the plant, and is recognized as the largest kiln building in the world under one roof. It covers a floor area of 60,896 square feet, and houses twenty-four 7½-foot by 7-foot by 125-foot kilns, which lie on an incline of ¾-inch pitch, and are individually operated by a 30-horsepower variable speed motor with a controller at the burner end of the kilns. Each kiln is provided with a stack 5 feet by 80 feet at the far end of the kiln. Fourteen of the kilns are now in daily operation, each of which easily produces its 500 barrels of clinker in twenty-four hours.

The raw composition is fed into the stack end of the kiln by means of screw conveyors from the hopper base of the kiln bins, which, under the rotation of the kiln is carried onward and downward through the heat zone, where it is calcined to incipient fusion and discharges into a pit as clinker. The burning is accomplished with crude oil and compressed air. The oil is of 17 degrees Beaumé gravity, and the air pressure is 80 pounds at the burner. Approximately 2,000 barrels of oil are consumed per day.

From the clinker pit the clinker is delivered into coolers which finally discharge into a portable steel skip on a narrow-gauge track, to be taken to an open-air clinker storage.

CLINKER STORAGE

The clinker now in the steel skips, which hold thirty barrels, is delivered to the clinker storage pile by means of a Flory hoisting and cable apparatus. The 2½-inch steel strand cable, resting on towers at either end, 160 feet in height and 1,200 feet centers, supports a carriage, holding the suspended clinker skip which is run back and forth to the clinker storage. The dumping and operation is controlled from the hoist installation at one end of the cable. In the writer's opinion, one of the chief assets to a cement plant lies in a large clinker storage. It not only gives plant flexibility, but gives an ageing to the clinker which favorably affects its quality as well as the final grinding. The clinker storage at this plant covers an area of 80,000 square feet, on which approximately 500,000 barrels of clinker can be stored. (Illustration No. 5.)

The clinker storage has fourteen tunnels underneath, into which the clinker is drawn through chutes directly on to belts which convey the clinker to a cross belt running into the finishing mill. (Illustration No. 6.)

FINISHING MILL

(Illustration No. 7.)

The clinker is received in a steel bin directly over the stack end of the dryer, pro-

No. 5 Clinker Pile, Approximately 300,000 bbls.

No. 6 Clinker Pile East End, Showing Relative Height to Buildings

vided with an adjustable rocker feed which delivers the clinker into the dryer. While the clinker passes through the dryer a low heat is applied when necessary to drive off any water absorbed by the clinker through rains or damp atmosphere, thereby avoiding any clogging of ball mill screens. To retard the setting time of the cement, about 2½% of gypsum is added in the dryer discharge pit from a bin controlled by an adjustable rocker feed.

The gypsum is fed into the pit by a continuous belt which delivers a continuous stream simultaneously with the clinker stream discharged from the dryer. This assures a thorough distribution of the gypsum and a well-regulated setting time of the cement.

No. 7 Finishing Mill

From the dryer discharge pit, the stream of combined clinker and gypsum is elevated and conveyed into the ball mill bins. Through the hopper of the bins the material is fed into ball mills, eighteen in number, similar in type and size to those in the raw mill building. From the ball mill discharge the stream passes through elevators and conveyors into the tube mill bins. From these bins the material passes on into the tube mills for its final grinding. The tube mill installation consists of twenty-four mills, 20 of which are in constant operation. The tube mill product, which is the cement, is an impalpable powder, 80% of which passes a 200-mesh screen. The product is elevated and automatically sampled while conveyed into a large stock house.

STOCK HOUSE AND PACKING HOUSE

The stock house, which consists of ten separate bins, is of concrete construction throughout and has a capacity of 128,000 barrels of cement. The base is of the hopper and tunnel type construction, two of which run longitudinally through the entire length of the stock house. By means of screw conveyors, the cement is conveyed through these tunnels into the packing bins adjacent to the stock house. Eight Howe packing machines mechanically fill the sacks, which are carefully weighed and tied and passed on trucks into cars.

No. 8 Stock House—Freight Cars at Loading Platform

Beginning at a point at one end of the loading platforms on each side of the stock house, two car tracks, on a slight incline, are run on an extended line of about 900 feet, to provide for car storage while loading. The incline enables the operator to shift his cars by gravity directly to the loading platforms, which provides for eight cars on either side. This arrangement has operated very satisfactorily on shipments of 10,000 barrels per day. (Illustration No. 8.)

Another storage of 25,000 barrels capacity adjacent to the stock house is provided for storing cement sacked. [The consumer who wishes to sample and test his cement before shipping is thereby given excellent facilities for storing and sealing his lot while waiting for his 28-day test.] A portable sack stacker, electrically operated, stacks the sacks in tiers of 24 sacks in height.

BAG HOUSE

This building provides for both new and cleaned sacks. The sacks to be cleaned are placed in two cylindrical drums in batches, the drums rotated and the bags thoroughly shaken. The slatted perimeter allows the cleanings to drop through to the floor. The bags are removed from the cleaner through a door provided in one section of the slats. These two machines are wholly enclosed in a timber casing with a door for access, thus avoiding the dusty operation.

COMPRESSOR BUILDING

The air consumed at the limestone quarry for drilling apparatus, and at all the oil burners throughout the plant, is supplied by five Ingersoll-Sargent air compressors running alternately, four of which are of a duplex type 20¼ inches by 24 inches, and one a compound 25¼ inches by 16¼ inches by 16 inches; all of which compress to 80 pounds pressure. The air consumed in cooling the clinker is supplied by six Sturtevant steel pressure blowers. The entire equipment is housed in this building and operated by two 800-horsepower motors.

MACHINE SHOP AND STOCK ROOM

The machine shop is fully equipped with various kinds of machines to facilitate all necessary repair work accruing in the plant. The adjoining store room has a full stock of supplies and duplicate machine parts, which are systematically segregated for convenient access, and its contents accounted for through a stock ledger. All withdrawals are carefully charged to the various departments in which the supplies are used.

POWER

Electric power, which is furnished by the Pacific Gas and Electric Company, is used exclusively in this plant. A description of its installation and equipment will be found in a different number. The current is transmitted to a total of 78 motors varying from ½ to 800 horsepower. The entire plant consumes approximately 6,500 horsepower when running under normal conditions.

CRUDE OIL STORAGE

The oil cars as received at the plant are run in trains of eight cars over a concrete trench, into which the cars simultaneously discharge their oil. The trench has a sloping bottom from both ends to the center, where a 12-inch pipe conveys the oil by gravity to two large storage tanks with a capacity of 37,000 barrels each, located at a distance of 600 feet from the oil trench, directly on the shore line of the ocean.

A pumping system delivers the oil from the tanks through pipe lines, supplemented by a steam pipe line to facilitate the flow of the oil, into a pressure tank from which the oil is distributed throughout the plant.

LABORATORIES

This department comprises the chemical and physical laboratories and the sample grinding room.

The grinding room has a complete installation of sample grinding machines and oil-testing apparatus.

The laboratories are thoroughly equipped with all the necessary apparatus for chemical and physical determinations on all materials pertaining to cement and cement manufacture. All methods conform with those prescribed by the American Society for Testing Materials.

OFFICE

This department accomplishes its work in six separate rooms, one each for the superintendent, chemist, time-keeper, shipping clerk, bookkeepers, and draughtsmen, together with store room for office supplies, and concrete vaults for the preservation of records and drawings.

The plant is in operation both day and night throughout the entire year, and employs a daily average of 550 men.

Resolution Adopted July 31, 1911, by the Board of Directors of Pacific Gas and Electric Company

WHEREAS, death has suddenly called from us MR. N. WETMORE HALSEY, who has been prominent in our councils since the incorporation of this Company, he having served at one time as Chairman of this Board of Directors, and, up to the time of his death, as a member of the Board of Directors of our two principal constituent companies:

NOW, THEREFORE, BE IT RESOLVED that the Directors of the Pacific Gas and Electric Company express their sorrow at the loss of so valued a counsellor and friend. The judicial care with which Mr. Halsey carried on the investigations on which he based his decisions and the unfaltering courage with which he supported undertakings after he had committed himself to them are qualities worthy alike of the admiration and emulation of his associates and successors. In his kindly tolerance and sympathy we recognize qualities which endeared him personally to a very wide circle of friends and acquaintances.

BE IT FURTHER RESOLVED that this preamble and resolution be recorded in the minutes of this Corporation and a copy thereof transmitted to the bereaved family, as a mark of esteem.

Pacific Gas and Electric Company

Increase of Capital

THE following letter is being mailed to each of the stockholders of the Pacific Gas and Electric Company. There are approximately 1,500 of these with average holdings of about 200 shares. The letter is self-explanatory.

September 1st, 1911.

TO THE STOCKHOLDERS OF THE
OF THE PACIFIC GAS AND ELECTRIC COMPANY

Purusant to resolutions adopted by your Board of Directors on August 15th, 1911, special meetings of the Stockholders have been called for October 23rd, 1911, for the purpose of voting upon the questions (a) of creating a new mortgage under which the Company may, from time to time, when and as required, issue its bonds to the maximum amount of $150,000,000.00, and (b) of increasing the common stock of the Company to an amount sufficient to enable it to comply with the California statute under which no California corporation may have outstanding indebtedness in excess of its subscribed capital stock.

The new bond issue will provide the means for refunding or retiring at maturity, or as occasion may arise, all of the existing bond issues of the Pacific Gas and Electric Company and of its subsidiary and controlled Corporations. This will eventually absorb about $67,000,000. of the new issue.

The remainder of the new issue, about $83,000,000, will be available for such extensions, additions, improvements, betterments, etc., as the growth of the Company's business may require and will be ample for these purposes for some years to come.

During the five years to December 31st, 1910, the gross business of the Company expanded from $8,947,162.00 to $14,044,596.00; an increase of $5,097,434.00, or 57%. During the same interval more than $17,000,000.00 was expended for tangible additions to the plant. Your Board has every reason to anticipate a continuation of this growth, with a corresponding necessity for heavy capital outlays in the future, and deems it obviously prudent and to the best interests of your Company that it be supported in the recommendation for the increased capitalization as above outlined. To this end a blank form of proxy is enclosed, which you are respectfully requested to execute and return to the Secretary of the Company, as promptly as possible, in the envelope herewith.

FOR THE BOARD OF DIRECTORS,
FRANK G. DRUM,
President.

Testing of Transformer Oil

By WALTER J. DODGE, Operator, Electra Power House.

IT IS a very important factor of any electrical plant to see that its transformers are kept supplied with good transformer oil.

It may be of interest to some of our readers to tell for what reason it is necessary that oil is used in transformers. Oil is used mainly for two reasons:

(1) It is a non-conductor of electricity, and therefore by having it around the coils of a transformer, an almost perfect insulation is formed between the wires of the coils.

(2) When a load is impressed on the transformer, or, in other words, when electricity is flowing through it, a considerable amount of heat is developed. If the coils become too hot, there is danger of their burning out, and in order that this may not happen, oil is used to keep them cool.

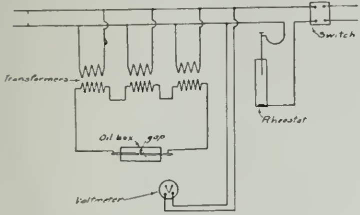
The practical methods of cooling transformers are three: The oil-filled-natural-air cooling system, the oil-filled-water cooling system, which uses both oil and water, and the forced-air-blast system. When the transformers are small, such as we see on poles about the city streets, the oil-filled-natural-air cooling system is used. That is, the oil circulates around the coils within the transformers by convection, due to the heat generated by the electricity in the coils, and as the heated oil comes in contact with the outer case, it is cooled by radiation into the atmosphere. In the large transformers, such as are used in power houses and substations, the heat produced cannot be so easily dissipated, and some other means must be used. In these large transformers, oil is placed around the coils in the same way as it is done with the small ones, and in addition a coil of water pipes is placed on the inside of the case. Water is allowed to flow continuously through these pipes.

In some very large recently constructed transformers the system used in small pole-top transformers is modified so that the oil-filled-natural air-cooling system can be advantagously employed. The heated oil which naturally rises passing up through the coils of wire is allowed to return to the lower parts of the case through external circulating pipes presenting a large surface to the air for liberating the heat.

The forced-air-blast system is not used on transformers above 20,000 volts, and is becoming obsolete. It is with the oil-filled-water-cooled type of transformer that we are most concerned.

Water is a good conductor of electricity, and if any should escape from the pipes the oil surrounding the coils would be changed from an insulating liquid to a conducting liquid. If this condition be allowed to continue, the result would be the burning out of the transformers. It is for this reason that so much care is taken to keep the oil in perfect condition. A small tap is placed at the bottom of the transformer, from which the oil can be withdrawn, as water is heavier than oil, and if any great quantity should leak from the enveloping coils, it could be detected by drawing a sample from the tap into a glass jar, and then examining it.

To detect smaller quantities of water or other impurities in the oil, another method, the high voltage test, is used. A set of small transformers are so connected that a very high voltage can be obtained on the secondaries. In the test which the author has in mind, three 100-watt transformers with a 100 to 1 ratio were used. The obtainable pressure was from the ordinary 110-volt lighting circuit. The primaries of the three transformers were connected in parallel to the 110-volt circuit, and the secondaries in series with each other. Thus the voltage could be stepped up to 32,000 or 33,000 volts. The two ends of the secondaries were connected to two ¼-inch copper rods, leaving a two-tenths-inch air gap between the rods, and all enclosed in a small box. A switch, water rheostat and voltmeter were connected to the system as shown in following diagram.



The oil to be tested is poured into the box, the switch closed and the plunger of the rheostat slowly lowered. The voltage across the gap can easily be calculated, depending on the connection of the transformers. In this case it was obtained by multiplying the voltmeter reading, on the low side of the transformer, by 300.

The voltage is raised until the oil between the rod breaks down, or, in other words, until a spark jumps across the gap in the secondary.

The voltage which good transformer oil must withstand before breaking down across a two-tenths-inch gap must be at least 22,000 volts. In the above, oil from a bank of three transformers was tested. The oil from numbers one and two broke down at 28,500 volts, while in the case of number three, the oil could not be broken down with 32,800 volts, the highest voltage obtainable; showing a perfect condition of the oil. Should the oil have broken down at say 17,000 volts, it would indicate the presence of moisture or other impurities, or a poor grade of oil.

The results of this test is only another example of the perfect condition in which the various branches of the Pacific Gas and Electric Company's electric plants are kept.

A "Gas" Bookkeeper's Nightmare

By EUGENE A. BEAUCE, Bookkeeping Department, San Francisco Gas and Electric Company.

One day a gas bookkeeper,,
After fourteen hours of grind,
Fell asleep and had a nightmare,
I'll tell, if you don't mind.

He dreamed right was his "balance,"
His "meter count" "O. K.,"
His additions had no error,
Then he got feeling gay.

The little "Joys" were dancing
Round him with joyous mein,
And he was much elated,
Till "Glooms" came on the scene.

For then it dawned upon him,
His work was not quite done,
His "Green Inks" were not added,
And then began the fun.

He turned the ledger pages,
Saw nothing but green blots,
The figures were all muddled
And hidden by the spots.

His hands with green were dripping,
(His thoughts don't go in print,)
He scooped and drank a handful,
He thought 'twas "Creme de Menthe."

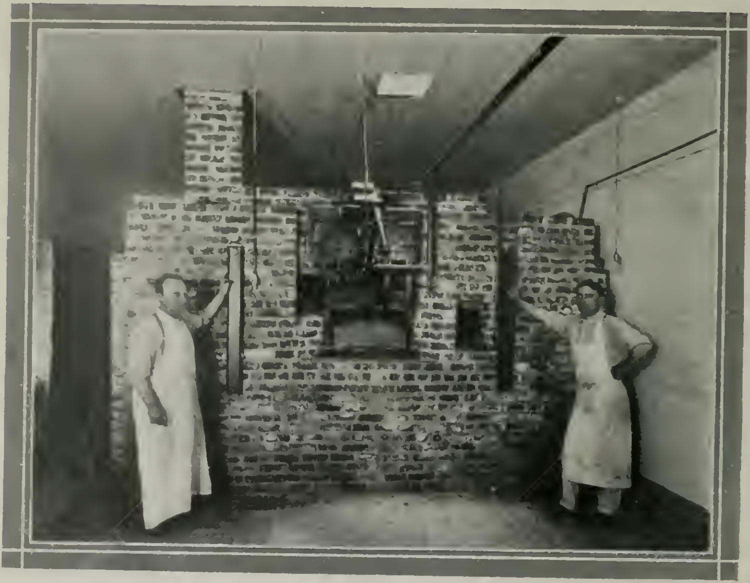
And then he started working
On "Refunds," good and bad,
That "Correspondence Doping,"
It nearly drove him mad.

He dreamed that he was swimming
In a sea of dark green ink,
An adding machine for ballast,
Which made him quickly sink.

The third time down he's going,
Then wakes up with a sigh,
The rate is "85" now,
So he kissed "Green Inks" good-bye.

Gas for the Heating of Dutch Bake Ovens

By J. B. REDD, Contract Department, San Francisco Gas and Electric Company.

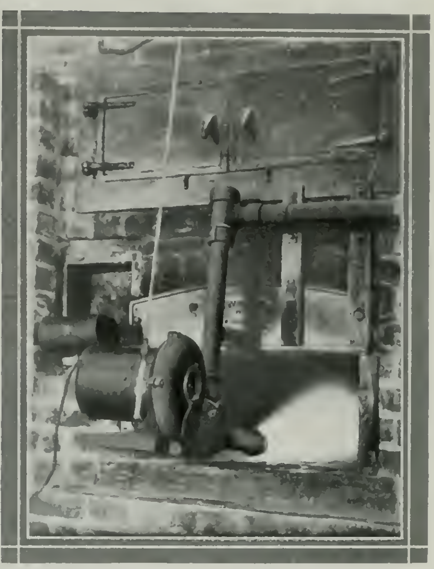


OF THE many new usages for gas, there are few that offer a more profitable field than the heating of the Dutch bake oven, which, heretofore, has been largely done with wood. For sometime past, oil has been tried, while recently artificial gas has been used to a greater advantage than any other fuel, and is being recognized by the baker as the greatest of time and labor savers, besides being economical as to cost.

During the past month, five of these ovens have been converted to gas, and the accompanying pictures show one of the latest installations in daily use at the Home Bakery, 1149 Valencia Street. Mr. Winterrowds, the proprietor, is a big booster for the installation, and takes pleasure in talking of its many advantages. He has used wood for a number of years, and thoroughly appreciates a change to gas.

The above illustration shows the burner and connections when not in use. The apparatus is held out of way by a rod suspended from the ceiling, and is counter-balanced by a weight at the rear of the oven. The burner, when about to be put in action, is brought into position by the use of a swing joint, and the flame can be directed to any portion of the oven.

The second picture shows the burner in operation. The flame is allowed to burn in the center of the oven and on either side for



fifteen minutes each. A twelve-inch fan blower, directly connected, is used, and gives the best results, as a large volume of air is necessary to produce good combustion. This makes a neat, compact appliance, and can be operated by any one.

By careful experiments, the consumption of gas has been reduced to 600 cubic feet per hour, which is a large decrease from the first burner installed. This particular oven is nine, by eleven feet, and can be heated to a temperature of 600 degrees Fahrenheit in forty-five minutes, which will be reduced to a temperature of 300 degrees Fahrenheit after six hours baking. Higher temperature can be obtained at any time by flashing the oven from ten to fifteen minutes.

Especially to the baker who has been in the habit of firing with wood, will the gas burner be a revelation as to the saving of time and labor, as he has been accustomed to waiting five hours from the time the fire was commenced until the oven was in condition to receive the first batch of bread. Three hours were necessary for the wood to be consumed, one hour more to take out the ashes and clean the oven, while the oven was allowed to stand another hour in order to obtain as near an even temperature as possible, for where the wood was not of an absolutely uniform size, portions of the oven were of higher temperature than others.

With the use of gas, forty-five minutes only are necessary to heat the oven, which is allowed to stand about forty-five minutes more in order to get a complete diffusion of heat, and a perfectly uniform temperature throughout the oven. A saving of three and one-half hours in the busy time of day is certainly worth while, and will interest the most skeptical. The cost of installing a gas burner of this type is about $75.00 plus the cost of piping to within ten feet of the oven.

Cannot Force Utility to Run at Loss

According to a court decision, the New Sharon (Ia.) Public Utilities Company cannot be forced to run its plant at a loss. The contract with the electric light company was canceled but the town authorities demanded that the plant continue to operate despite the contention of the company that its operation would be unprofitable. The town authorities then went into court and asked that a receiver be appointed for the company.

The court in its decision held that the town had no right to ask for a receivership inasmuch as it was not a stockholder of the company and that it could not compel the utility to operate its plant at a loss.

Electric Talks

VIII—What is a " Watt," or Its Influence on the City Beautiful

By JOSEPH P. BALOUN, Head Draftsman.

J. P. Baloun

Modern street lighting systems of either direct or alternating current command today much more intelligent investigation, comparison and comment on the part of the general public and town councils than in former years.

We note the town crier centuries ago making his faithful nightly rounds, carrying with him his trustworthy glim. This latter was usually some vessel with a brand of fish oil and some sort of vegetable hemp or jute wicking therein; and this, kind readers, was the portable "battery" that our father's fathers used.

We all know with what sacred care the preservation of the tiny flame, kindled by the use of the piece of flint and steel, was kept nourished by day and night with the aid of wood and peat fuel. It indeed was a tedious task for the unfortunate one that was obliged to renew the necessary flame to be used for heating, lighting and comforting the dear homes of yesterday, that is within the recollection of the oldest inhabitant. Our grandmothers have told us, while we have rode on her knee, how her mother borrowed some glowing coals from a neighbor, whereby the difficult means of starting a fire or procuring some light from a pitch-pine torch or an oil-soaked wick was averted, and yes, many, many times more fuel than was necessary to both warm and lighten, was used because the light must not go out. For although the mothers of those days were as lovable and patient as our own of today, it was one of the chores of that olden times to nurse the glim or torch in the daytime so that there would be the wherewith to have some illuminant at dusk. Yet, how those lights smoked, flickered and sputtered, and how unsteadily the power of the torch and wick varied. It was no wonder that the most ambitious in those days and nights exerted more genuine humane effort to reach a particular goal than in this automatic age of ours. Briefly, the mechanical electric automaton of today is a substitute for the humanograph of those times, that has been outclassed only by persistent development and most diligent research.

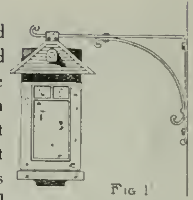


Fig 1

The slow, steady progress from the condition of the back ages in the utilization of heat and light to the still far unperfected so-called modern system of lighting, is most remarkable. It is also deplorable that such a long period of stagnation of advancement could have been accepted by such intelligent people. There is no doubt but that generations from now we will have as much to account for as we seemingly feel justified in doing, in picking out the weaknesses of our forefathers.

Our most gracious Nature has doubtlessly advanced the man of today as she has his abilities, and thus the output from the man of tomorrow will be in proportion to his advanced capabilities. Therefore, today, if it is desired that a city be made dearer to its citizens by being better illuminated and by being more beautiful than yesterday, what is necessary to be done? Let me be your guide: first —discard the methods of yesterday and change, alter and install the very best of today.

To encourage and induce the citizen to

adorn the entrance to his private residences, apartment houses and hotels, clubs, libraries, art galleries and business buildings, should be a citys duty. A municipality can only encourage this to be done, not to compel it. For as impossible as it is for the "tail to wag the dog," just so must every promising, advancing city, begin the task of beautifying itself, and set the example to its good citizens. After such a beginning and the same is followed by still more examples of civic reform, the remainder is simple.

Following close upon the heels of determination is the question of the engineering and the ornamentation of the object in view. Then before the final closing of the deal or the proposition the most important item of finance confronts one and that often times proves the stumbling block or the weakness that must be overcome by the architect, engineer or lighting committee. It so often is the case that to install a lighting system within a given appropriation for a certain project, that due to a great oversight in miscalculation and misconception of what is really needed, that the results are so inadequate to the fulfilling of the desired effect of illuminated decoration. Then a financial compromise is made because of the expense that has been under-estimated in providing for the electric light bills for the sustenance of certain lighting features. This matter of charges for electric current which varies so much between a very large consumer, with a great and constant demand of electricity, and the individual residence, which uses but a fraction of the other's amount; and also at a time in the evening when the peak or maximum loads have to be handed with the maximum operative machinery for generating the same. This is why we find so many modern towns utilizing the motor driven pumps for use on municipal wells and water supply, because of the fact of a very low rate of charge per kilowatt hour, when operating on an off peak load of the electric generating stations.

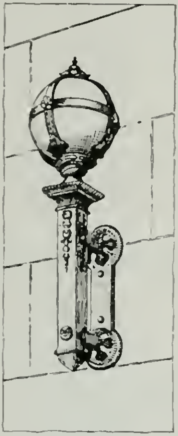


FIG. 2

This question of the cost per kilowatt hour or the wattage consumption by any given electric light installation, whether private or public, is the expense bug-a-boo that often hinders us from obtaining the prettiest scenic, panoramic or individual effects so often necessary to effect completeness of design and utility.

Thus it can be readily estimated by anyone why some large beautiful stores and buildings can be made so highly attractive through the beneficial illumination in the day time, at a rate of several cents per kilowatt hour. Otherwise a very contrasting gloom would pervade these many buildings in the day hours, due to the enormous height of adjacent structures and the depth of the same. This is why the usual housekeeper is obliged to pay as high as 10 cents per kilowatt hour, because in proportion to the cost of the house installation the returns on the investment to the Company are so slow and uncertain. In other words, though somewhat of a parodox, the more light that is used, the less the rate. Then, and only then, will the lighting bills help to pay for the running expense of the installation, and leave a very small margin of profit to the electric light company.

Therefore, to properly charge the consumer with the exact consumption of electricity utilized on his premises, it has been necessary in most cases of any magnitude to install meters for measuring the same. The matter of measurement and charge is even further divided, for often, for large concerns and enterprises, two or more electric meters (called watt-meters) are connected in such a manner that a low rate of charge is allowed up to only a certain time of day, after which another meter with a higher charge is made operative, and so on.

The term of kilo-watt hour is now the universal term applied to the consumption of electricity. It is equal to a 1,000 watt-hour, which signifies a watt has been used for either 1,000 hours, or, the equivalent, that 1,000 watts have been used for one hour, or that 2,000 watts have been used for one-half hour, and so on. The term watt is the same as the compound word volt-ampere (the result of multiplying the volts and amperes), but is far more simple, more used, and more convenient, and is the now established unit of power or rate of work. Seven hundred and forty-six watts are equal to one horsepower.

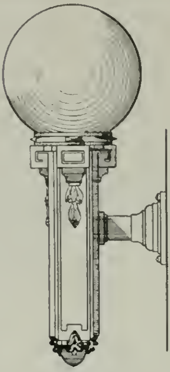


FIG 3

In connection with the adoption of any system of illumination the candlepower of the lamps is a frequently debatable subject. For it is really the actual number of watts that a lamp is requiring for its maintenance that is of value to the contractor or housekeeper. The measurements should also be made right at the terminals of the lamp with no sensible resistence in series with the lamp or arc. In case such a resistance is used, it should be excluded in the measurement of the voltage.

FIG 4

FIG 5

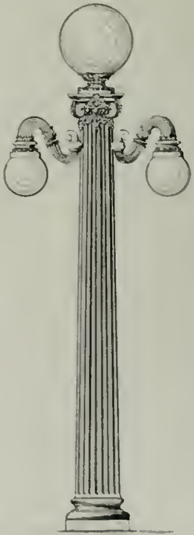


FIG 6

Thus it has become so widely the education of every citizen to be aware of the watt consumption of this light, and that lamp, or some other form of arc that the every-day individual is more and more posted to the economy of certain lamps over others, due to their less consumption of watts, and despite the fact of higher first cost, etc. So, due to a saving in electric current consumption and a lowering of the consequent electric light bills, I suggest putting some of this money saved into handsomer fixtures, prettier brackets, grander and more magnificent electroliers than we have now; also more and more of this class of decoration must be demanded by us.

For instance, Fig. No. 1 makes a very neat gate or porch design for a country home. Figs. No. 2 and No. 3 would be neatly conspicuous before a hall, club, or sanatarium. Fig. No. 4 would make our driveways, plazas, and parks very effectively lighted in the evening, and Figs. No. 5 and No. 6 would do justice as sidewalk entrances to our municipal and business buildings, libraries and theatres.

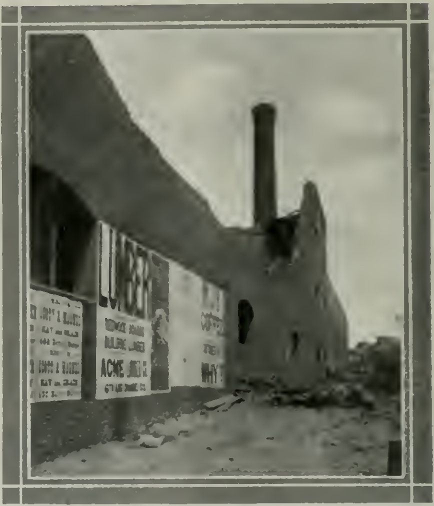
As for the actual illuminated boulevards that are to be the leading ones during the season of the World's Fair in 1915, from the grand courts at the Ferry Building, out Market Street, to the Civic Center, and thence along Van Ness Avenue to the general entrance at Lombard Street, allow me to suggest that it cannot be too beautiful.

* * *

The new department store, recently constructed for the H. C. Capewell Company in Oakland. This building has a frontage of 300 feet on Clay Street, and the power and lighting service will be furnished by the Oakland Gas, Light and Heat Company. The building is illustrative of the many new magnificent buildings recently erected in Oakland.

Reminiscences of Old Station B

By CHARLES R. HARLOW, Operator at Station "A," San Francisco Gas and Electric Company.



THOSE of you that have passed and repassed the Southern Pacific Depot at Third and Townsend Streets have no doubt had your eyes attracted to a large smoke stack standing near by, that bears the sign "Hay and Grain."

Wonder may cause you to pause in your travels and ask yourself the question, "Why this smoke stack at this place?", and above all, "Why does it bear the sign of a firm that sells hay and grain?" Surely no hay merchant has such a large amount of waste hay or straw that he must have such a large furnace to burn it in."

But the surmise is wrong. This smoke stack, together with the brick walls from which it rises, marks all that is left of what once was one of the liveliest electric light stations in the West. And, further, when we remember back to a day in 1906, and the things that happened thereon, we cannot but admire the fact, and feel proud that Old Station B's smoke stack went through that shake and never lost a brick.

And even though it has been humiliated to the extent of being made a sign of, it proudly stands as a monument of good work and attests the fact that they that built it, built well.

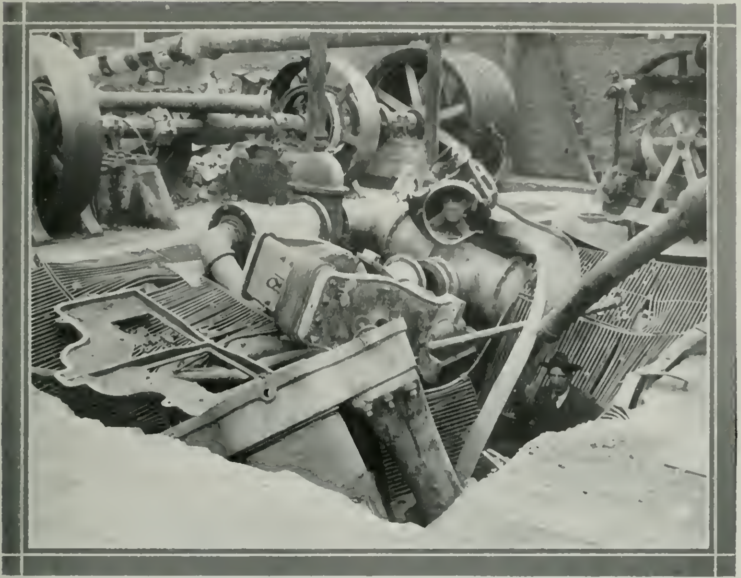
The men that erected this plant were pioneers in the electric light business and pathfinders in the electrical field. Love of work, attended by the excitement forerunning a new discovery in some branch of the new field, led them to do honest work.

I cannot help but think of my first visit to this station at a time when it was in full blast, and also of my experiences in after years, when, as an operator, I guided a few of its destinies.

I can see it now before me as it looked at that time. Back where the stack now stands was the boiler-room with its various kinds of boilers and steam pipes without number.

Further ahead, toward the front of the building on Townsend Street, was the engine-room. It contained one Savage, one Todd, and two big Allis-Corliss engines, having immense flywheels with rope drives to big lines of shafting.

From these lines of shafting, belts ran up through the floor to the machines in the dynamo-room, which was located on the floor above. Back of the Boiler-room and behind the brick wall that separated it from the old engine-room, was a new engine-room that contained two Union Iron Works engines that



were directly connected to General Electric alternators.

But the scenes of greatest activity were in the old engine- and dynamo-rooms; at that time the Citys' lighting was done with open arc direct current lamps, and all the circuits were run from Station B.

Each of the belts that ran up through the floor drove a machine of some kind. There were 50- and 125-light Brush arc machines, and 80- and 150- Wood arc machines.

There were also some old Edison bipolars, besides Stanley alternators, that took care of the lighting load in the outside districts. It was a sight worth seeing when the engines were going and all the machines in operation. The hum of the machines had a peculiar fascination, while the hundreds of bluish sparks on the arc machine brushes had the appearance of rows of diamonds.

But when trouble was on, how different. The flashing of the machines kept the attendants on the run, while the roar made by the big Wood machines could be heard all over the plant. But it was exciting, and the operator that went through the work at Old Station B certainly had some good, hard experience.

I cannot help but think how different it was from the power house operation of today, where the operator handles all of his troubles at the switchboard without having to run to each machine to cut them out and keep them from burning up the commutators and brushes.

Also the wonderful changes that have taken place from then to now. The arc machines have all gone out of use, their place being taken by alternators, and, just as this happened, so are the engines bowing down before the strides of the steam turbine. But Old Station B lighted the path.

Domestic Science Lessons

By MRS. H. ROSE STEWART

LESSON II

FRUIT SALADS AND SAVORY DISHES

ALLIGATOR PEAR SALAD

One of the most appetizing fruit salads is composed of the alligator pear and grape fruit. Peel, cut in quarters, and remove the seeds and pith from two good sized alligator pears, and cut them in slices. Cut a medium sized grape fruit in halves across the section. Remove the seed pocket and seeds. Loosen the fruit from the rind by running a sharp knife all around the inside, then loosen the pulp from the film and lift it out of the sections with a spoon. Mix the grape fruit pulp and the slices of the alligator pears lightly in a salad bowl. Pour over the whole a French salad dressing, with less than the usual amount of vinegar, and use paprika instead of black pepper, and serve with an accompaniment of cream cheese and thin toasted wafers.

FRUIT SALAD

One cupful of sugar, one cupful of water, one tablespoonful of chopped almonds, one tablespoonful of pistachio nuts, one liquor glass of maraschino, and a bowl of summer fruits, such as blackberries, currants, grapes and sliced bananas. Get as great a mixture of fruit as possible, so as to improve the flavor and appearance of the salad. Place in a bowl with the blanched and chopped nuts. Put the sugar and water in a saucepan, boil for a few minutes, and pour it over the fruit. Just lightly mix the syrup, and leave the salad till cold.

A DELICIOUS FRUIT SALAD

Two apples, two oranges, one banana, half a cupful of blanched and chopped English walnuts, some celery, a little celery salt and white pepper.

Peel and slice the apples, add the oranges cut in cubes, then add as much cut up celery as there are oranges and apples put together. Now add the sliced banana and walnuts, flavor with the celery salt and white pepper. Stir up lightly with a silver fork. For a dressing put one cupful of rich sour cream into a basin, stir in gradually half a cupful of melted butter, then add the juice of a lemon drop by drop. Beat in the beaten whites of two eggs.

A DAINTY SUMMER SALAD

Cut four slices of pineapple into dice, add one cupful of cherries that have been seeded and stuffed with pieces of walnuts. Serve with the following dressing:

Blend a tablespoonful of butter and a tablespoonful of flour in a saucepan over the fire, add one cupful of cream and stir until it boils, then add a quarter of a cupful of lemon juice, and just before removing from the fire, stir in quickly the yolks of two eggs beaten with a quarter of a cupful of sugar, add a pinch of salt and a pinch of mace, and have it very cold before serving.

FRUIT SALAD IN GLASSES

Put into dainty glasses layers of strawberries, thin slices of banana and orange pulp and chopped angelica. Pour into each glass two tablespoonsful of the following mixture: Half a gill of syrup, the juice of a strained lemon, one liquor glass of maraschino, and half a cupful of white grape juice. Keep on ice until required for the table. Serve with lady fingers. Shredded pineapple and celery make a novel salad. Place on ice until wanted. Mix with sufficient mayonnaise to moisten and season the salad. Garnish with slices of lemon and serve ice cold.

PINEAPPLE SALAD

This is one of the best of all the fruit salads, served either during the meal or as a sweet course at the end, both of which forms a suggestion. For the first, pick up the pineapple in rather large bits and put in a glass dish and place ripe strawberries over the top. Cover with French dressing and stand the dish on a platter on which is a quantity of broken ice. Or, to vary the salad, prepare as above, but pass mayonnaise with it, beside the dressing. To turn this into a sweet dish, and yet keep its salad form, prepare a pineapple and cover it with powdered sugar and sprinkle it with the juice of a lemon. When ready to serve, put maraschino cherries over the top, and pour the juice over all; serve on the ice as before.

PRUNE AND PECAN NUT SALAD

Soak half a pound of prunes in cold water over night, then let cook until tender and the liquid is absorbed. When the prunes are cold, cut the flesh from the stones in lengthwise slices, pour over these about three tablespoonsful of sherry wine and set them aside in a cool place; cut a cup of pecan-nut meats into three or four lengthwise pieces. When ready to serve mix together a scant half teaspoonful of salt, three tablespoonsful of olive oil and a tablespoonful and a half of lemon juice, and pour over the prunes and nuts; with a silver fork and spoon turn and mix the whole together, adding salt, lemon juice or oil, as the taste dictates. Serve on well-washed and dried lettuce leaves with roast lamb or veal, lamb chops or bread and butter.

GRAPE SALAD

Cut grape fruit or large oranges in halves, remove the pulp and juice, and then pull out the lining membrane. Add to the pulp half the amount of bananas cut in bits and the same of fresh Muscatel grapes, peeled, cut in halves and seeded. Allow two tablespoons of grape juice to each portion, mix it with the fruit and sugar to taste and chill thoroughly. Fill the fruit shells and serve.

SAVORY SALADS

TOMATOES IN ASPIC

1 pint Aspic jelly
6 small tomatoes
1 gill Mayonnaise sauce

Set a little jelly in double molds, slice the tomatoes, place a slice in each, pour over a little sauce, repeat till the molds are full, set with jelly, turn out and garnish with chopped jelly and water cress. Pour the remainder of sauce in the center.

CELERY SALAD

2 bunches of celery
1 tablespoonful salad oil
4 tablespoonsful vinegar
1 small teaspoon fine sugar
Pepper and salt to taste

Wash and scrape celery; lay in ice-cold water until dinner time. Then cut into inch lengths, add above seasoning. Stir well together with fork and serve with salad bowl.

CHICKEN SALAD

Cut cold roast or boiled chicken in small dice, add ½ as much blanched celery cut fine, season with salt and pepper. Mix with French dressing and set away for an hour or more. Just before serving stir in some mayonnaise slightly thinned with lemon juice or French dressing, arrange on lettuce leaves and cover with thick mayonnaise.

CREAM CHEESE AND PIMENTO SALAD

Add to Philadelphia cream cheese (or fine cottage cheese will answer) as many chopped pimentos as will give decided flavor, roll into balls about size of walnut and place three or four on lettuce leaves for individual plates. Pour over all either French dressing or thin mayonnaise. The mixture is also excellent for sandwiches. The pimentos or sweet Spanish peppers may be bought put up in oil in small cans.

LOBSTER SALAD

Tear the meat of lobster into shreds with two forks, and let it get cold. Mix with blanched celery cut in small pieces—¼ celery, ¾ lobster. Mix with mayonnaise. Make cups of small blanched leaves of lettuce, fill with salad, garnish with mayonnaise, capers and lobster coral. Keep on ice until served.

SALMON SALAD

Remove bones and skin from can salmon. Drain off liquid. Mix with French dressing or thin mayonnaise; set aside for a while. Finish same as lobster salad. Other fish salads may be prepared in same manner.

POTATO AND EGG SALAD

Hard boil 3 eggs 30 minutes, shell and cut fine with silver knife. Boil 3 or 4 potatoes. Dice while hot, mix with cut eggs and add French dresing. Let stand till cold. Serve on bed of water-cress with more French dressing or boiled dressing thinned with vinegar.

COLD SLAW

Prepare ½ quantity boiled dressing. While hot pour over 1 quart shaved cabbage, cover closely; set away till cold. Red cabbage may also be used.

SALAD DRESSING

MAYONNAISE

Have dishes and ingredients very cold. If summer, set dish in a pan of pounded ice. In soup plate or shallow bowl put yolk 1 raw egg, add ¼ teaspoonful salt and dash cayenne, a few drops of tabasco and a teaspoon Worcestershire sauce, stir with fork till very thick. Add few drops olive oil and stir; add more oil, few drops at a time, until mixture balls on fork. Thin with few drops lemon juice or vinegar, then add more oil. Alternate in this way until 1 cup olive oil is used and dressing is thick and glossy, like jelly. About 3 tablespoons lemon juice or 2 of vinegar will be needed, according to its acidity. *Always stir in the same direction.* Keep covered and on ice until needed.

BOILED DRESSING

3 beaten eggs
1 cup rich milk
⅔ teaspoon dry mustard
2 teaspoons salt
2 dashes cayenne
2 tablespoons olive oil or melted butter
½ cup vinegar

Cook in double boiler till thick as custard. Strain and keep in cool place.

CREAM DRESSING

1 cup cream
1 tablespoon flour
3 tablespoons vinegar
2 tablespoons butter
½ teaspoon powdered sugar
1 teaspoon salt
¼ teaspoon pepper
½ teaspoon dry mustard
Whites two eggs

Cook in double boiler, stirring constantly, and adding whipped whites just before taking from fire.

CUCUMBER JELLY

At one of the largest cooking schools in the city the statement was made that cucumber jelly was seldom very satisfactory, though highly decorative. For a small mold peel three cucumbers and put trimmings, end pieces and two of the cucumbers in a stew pan with water to cover and cook twelve minutes or until tender. Then strain. Have ready half a box of gelatine that has been soaked in one cup of cold water for half an hour, and pour a pint of the strained hot liquor over it and stir until dissolved. Color with the juice of spinach to a delicate green and season with salt and a little tarragon vinegar.

Have ready sliced and crisped in ice water one cucumber. Drain well. Put a layer of the cucumber in the bottom of a mold and pour a layer of the hot liquid over. As it begins to set add more cucumber slices, then more jelly that has been kept warm so that it will pour, and so continue until the mold is filled. It should be a pale translucent green.

MINT JELLY

Mint jelly is the present novelty, proving delightful to the taste and pleasing to the eye. It is vividly green, as it would naturally be, since it is made from fresh sprigs of mint, and this in itself is unusual among jelly colorings. It is served with lamb or mutton and even with some sorts of game. The making of mint jelly is very simple. First the mint is boiled and strained and afterward enough heated sugar is added to make it form a jelly.

Sometimes, however, when the mint jelly is not sufficiently glutinous a little gelatine is mixed in to bring it to the right consistency. It should never be very stiff, as is realized by the melting almost immediately it is taken on a hot plate.

ASPIC JELLY

1 quart stock
2 ounces gelatine
The whites and shells of 2 eggs
A little parsley
A few peppercorns and cloves
1 tablespoon of vinegar
Pepper and salt
2 tablespoonsful sherry

First soak the gelatine in a little cold water. Drain the stock. Take off all the fat, add to it then the pepper, salt, parsley, spice and vinegar. Put it into the saucepan and stir over the fire until the gelatine is melted. Beat the whites and shells with a tablespoonful of water, add them, whisk briskly till boiling, then draw on one side and simmer 10 minutes. Strain through a jelly bag and add the sherry.

HELPFUL HINTS TO HOUSEWIVES

Wherever paprika is used in any of the recipes care should be taken to procure the genuine article. Paprika differs greatly from red pepper, as it is sweet and not sharp. The best Hungarian paprika comes from Szeged, and is so mild that it may be eaten by itself. It is prepared from a plant indigenous to Hungary called "Capsicum Anim." Most that is sold here is adulterated with brick dust. There is also a delightful cordial made from the plant that shows how sweet it really is and how palatable.

Great cleanliness, as well as care and attention, is required from a cook. Keep your hands *very* clean; try to prevent your nails from getting black or discolored; don't "scatter" in your kitchen; clean up as you go; put cold water into each saucepan or stewpan as you finish using it. Dry your saucepans before you put them on the shelf. Scour tins with good mineral soap and rinse thoroughly in hot water. In cleaning a frying pan, scour the *outside* as well as the inside. In cleaning greasy utensils, such as the soup-pot and frying-pan, wipe off the worst of the grease with soft paper (which can be burned), then soak in warm water to which soap-powder or a little ammonia has been added, finishing with mineral soap. Wash your pudding cloths, scald and hang them to dry directly after using them; air them before you put them away, or they will be musty; keep in dry place. Be careful not to use a knife that has cut onions until it has been cleaned. Keep sink and sink brush very clean; be careful never to throw anything but water down sink. Do not throw cabbage water down it, throw it away out of doors; its smell is very bad. Never have sticky plates or dishes; use very hot water for washing them; when greasy change it. Take care that you look at the meat the butcher brings, to see that it is good. Let there be no waste in the kitchen.

Poultry should be well cleaned and peppered if kept any length of time before cooking.

Toast should be pounded, buttered and kept between two plates until served.

The yolks of two hard-boiled eggs, well mashed, seasoned with salt and pepper, and spread on thin, well-buttered bread is excellent for dyspeptics.

To clean mirrors, sponge them perfectly free from all dirt with soft cloths, and when quite dry rub a little powdered blue over the glass, polishing it finally with a soft, old silk handkerchief.

To remove grease spots from carpets, take a flannel cloth saturated with benzine and rub thoroughly.

Aspic jelly makes a pretty garnish for cold luncheon dishes and salads. Chop it finely with a silver knife.

Pacific Gas and Electric Magazine

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VOL. III SEPTEMBER, 1911 No. 4

EDITORIAL

THE SUBMISSION TO THE PEOPLE AT the coming election of a large number of Constitutional amendments, brings forcibly to mind the incomplete character of our present Magna Charta.

Born as it was, in the dissenting days of 1879, when corporation rule was of the most antagonistic nature, both in politics and as to the general public, it is no wonder that in the modern days of 1911 it fits but poorly into the conditions of our State.

The evident intent of the Constitution was to deprive subsequent legislatures of the usual powers inherent in such law-making bodies, and further, it attempted to impose restrictions and qualifications upon public-service corporations. These restrictions and qualifications have resulted in exactly the opposite way from which they were at that time obviously intended.

Article 11, Section 19, of the Constitution, which, by the way, was an amendment adopted in 1884, as an amendment to the original section, provided for indiscriminate use of the streets of any municipality by any corporation; the intentions being, evidently, to invite competition, and to destroy monopoly. It has had quite the opposite effect: while inviting competition to the detriment, eventually, of the municipality, it has provoked monopolies.

The policy of this magazine is not to discuss in any way political measures; is not to attempt, directly or indirectly, to influence the votes of the employees of the Company upon any public subject, leaving to each of them the right to use his own judgment in matters political. It is, however, its province to comment, from time to time, upon matters of public importance affecting the industry which it represents, to the extent of giving voice to sentiments in an independent way, for the purpose of guiding those who may care to be guided, and, in the same manner as the daily press of our country, seek to guide and control the voices of the public, as expressed at the polls.

In furtherance of this, the MAGAZINE deems it proper at this time to call attention to the various amendments to be submitted, not so much in opposition to any one, or to all, of them, but as expressing a view, that their adoption but helps to make more complex our present organic law.

With the several amendments, if adopted, tacked on, our Constitution becomes a Joseph's coat of many colors, introducing factors of uncertainty and of experiment; not eliminating evils that exist, but rather adding to them.

The solution of the problem presented of a choice between an incoherent and undetermined fundamental law, and one built upon sound basic principles, would seem to rest in the calling of a Constitutional Convention, to present to the people of the State an organic law that will meet the existing conditions of today, and not leave a record of a Constitution which partly reflects only of the past, and partly of the present.

There would seem to be no immediate pressing need of incorporating any of the provisions proposed in the several amendments into the present Constitution, which must, within a brief period of time, be wiped out as ill-considered amendments, by necessity of the adoption of an entirely new Constitution.

A very gratifying news item has been received from Mr. W. E. Osborn, Manager of the Woodland District, announcing that the first shovelful of earth has been turned in the actual construction work on the new electric railway from Sacramento to Woodland.

The ceremony attending this event was preceded by a luncheon given by Mr. Gregory of the Vallejo-Northern Railway, to prominent visitors from Sacramento and San Francisco, and also to representative citizens of Yolo, Colusa and other northern counties.

After luncheon had been served, a procession, headed by the Woodland Band and practically all the school children, marched through Main Street to a point near the intersection with the Southern Pacific tracks.

Ex-Mayor Beamer introduced Judge Millington of Colusa, who made an address, complimenting the people of Woodland in felicitous remarks, after which the act of turning the first shovelful of earth was accomplished. Actual work is now progressing rapidly in general grading for the road bed.

Authorized Additions and Improvements

Stockton Power: Work has been started on construction of 5 miles of 10 K. V. Line from Webb Tract pump, to furnish service to the Bradford Island Reclamation District.

Redwood: Extension of H. P. Main through district known as Wellesley Park, to furnish gas service in Woodside territory, has been authorized.

Napa: An electrical smoke dispelling device, known as the "Cottrell Smoke Treater," has been installed at gas works to abate smoke nuisance.

Sacramento: Land has been purchased for the purpose of erecting thereon a substation in the southeastern part of Sacramento.

Chico: Extension of 3 phase line to Government Farm has been authorized for the purpose of supplying light and power at that point.

Napa: Work has been started on reconstruction of our lines in the business section of Napa.

The purchase of 5 automobiles has been authorized for use in the following power divisions: San Jose, Stockton, Solano, South Tower and Marysville.

Sacramento Power: Work covering repairs to the toe of Folsom Head Dam has been started.

South Tower Division: The erection of dwelling for use of operator at Antioch Substation has been approved.

San Francisco: An additional gasoline runabout has been purchased for use of Electric Distribution Department.

The general offices in 445 Sutter Street have now been connected in with the steam heating system being operated by the San Francisco Gas and Electric Company, with generating plants in the basement of the Emporium on Market Street and the Bohemian Club, Pine and Taylor Streets. This will do away with the old oil burning steam heating plant in the basement of 445 Sutter Street.

Thou hast forgotten what a holy bond of relationship uniteth every man with the human race—a relationship not of blood and birth, but participation in the same intelligence. The reasonable soul of each man is a God, an emanation from the Supreme Being.

—*Marcus Aurelius.*

What the Press Has to Say

New Gas Service is Being Installed

Seventy-Five Men to Draw Much Money in Pay Rolls

WHAT IS BEING DONE

Number of men employed	75
Duration of work (months)	4
Labor salaries	$24,000
Number miles new pipe	16
Number miles already installed	16
Total cost of work	$125,000

Trainload material used.

Increased storage capacity from 33,000 to 125,000 feet.

Largest storage tank in Northern California.

The promises made by the Pacific Gas and Electric Company some time ago that it would increase its plant and extend its field of operations here so that Chapmantown, Barber and Chico Vecino would have gas service, are being fulfilled, and today there are 75 men employed by the company installing new apparatus, digging trenches and laying pipe. The work will last for four months and the wages paid during that time will be a material benefit to the community.

In all there are to be 16 miles of new pipe laid in the suburbs. The entire mileage for the city will then reach 32 miles, almost treble that of any city north of Sacramento.

Twelve carloads of pipe have already arrived. In size it varies from one to six inches. The larger pipe is being used for mains.

The system which is being built runs south on Cherry to Eighth, then to Broadway, to South Broadway, South Fourth to Laurel. The main lines in Chico Vecino follows the Esplanade, where 20,000 feet of one-inch pipe is to be used as laterals. In all of the extensions over 85,000 feet of pipe is to be used.

All is activity at the gas plant in Second Street, near the S. P. tracks. A new steel reservoir is being built which will increase the present capacity from 33,000 to 125,000 feet. This will be the largest storage tank in Northern California. It is estimated that the entire outlay for the improvements will be $125,000, of which $24,000 will be for wages. With few exceptions the entire crew is composed of local men.

Chico Enterprise, August 25.

Gas Company to Erect New Warehouse

Corporation Wants Fire Plug at Corner of Marin and Maryland Streets

A permit has been granted the Pacific Gas & Electric Company to erect a warehouse on their property in block 216 to cost $1800. The building will occupy the east half of lot 3 and all of lots 4 and 5.

A request was made of the City Council yesterday by Manager Stevens of the Gas Company, to install a fire plug on the corner of Marin and Maryland streets.

Vallejo Times, Aug. 23.

Has Started to Abate Nuisance

Gas Company Lets Contract for Concrete Retort for Obnoxious Fumes

That the Pacific Gas & Electric Co. is making some move toward abating the fumes and soot nuisance, which has so long troubled Dominic Glover and other Maryland street residents, is evidenced by the fact that the big fuel concern has awarded to the Wm. Betts Cement Co. a contract for the construction of a mammoth concrete retort, which will hold the obnoxious discharges of the plant.

The Betts people have already commenced operations.

In response to the frequent complaints of Glover the company was directed by the city council a few days ago to get busy or be forced into court.

Vallejo Times.

Harmony *versus* Discord

By S. B. HARRIS, Oakland Power Division.

MANY interesting articles have been written relative to the peculiar mental conditions and habits obtaining with Railway engineers, especially in the passenger service, captains and officers of ocean liners, and in fact, the same mental conditions exist in the minds of all classes of men where great responsibilities rest upon them, and which may be analized and classified in some instances as a highly nervous temperamental condition, a natural inborn desire to avoid difficulties, and again can be attributed to superstition.

The same conditions obtain in reference to the average experienced operative in large electric stations, where there is a constant mental strain, and which result in these men at all times being adverse to discussing possible troubles in their different lines of work, or even allowing their minds to dwell upon the possibilities of trouble. From this you will naturally form the opinion that experience has taught them the truth of that old saying about never troubling trouble.

Nothing in the daily routine of an operative is so disconcerting as the mere mention that it has been a long time since a "short" has occurred in his station. The chances are that the very advancing of this idea will cause him to expect a "short" to occur before long, and the most peculiar part of it all is that a "short" often does follow such a discussion. Whether this is simply a coincidence, or the discussions of trouble often lead to trouble caused perhaps by nervous carelessness, is left to the reader to solve, or attribute to superstition as he may choose. Assuming, therefore, that such conditions do exist, that although they may be purely imaginary, the anticipation of trouble should be avoided when things are running in harmony. Harmony is as natural and beautiful in the operation of machinery as in music, and to the true mechanic, discord is equally as repulsive as it is to the sensitive ear of a trained musician.

When everything is running in perfect harmony, never strike a discord. Discords are jarring to the mental and nervous systems to say the very least, and it seems to be a fact that every kind of machinery and instrument, from the keen edge of a safety razor to a flying machine, responds to the mental attitude of the individual having it in charge.

Discord is a waste of power and, like a synchronous motor out of step, it takes up a lot of otherwise useful energy, and without result other than a disagreeable commotion and noise. Every natural force is at work to eliminate inharmony, so don't get out of harmony, or you may be eliminated.

The following order was recently received by one of the district offices, and although this message might not be entirely clear to a layman, a man was immediately sent to pump out the gas service pipes:

"Mr.

Please send me one boy to pomb my gas.

Coney Island,
No. 119."

The General Electric Company reports under date of May 17th that they are just putting out a new water-tight oil break switch for manhole service, which they claim is very substantial in construction, and suited to operation on circuits up to 7500 volts, in which normal current rating is 200 amperes or less.

Full description may be had upon application to the General Electric Company for their Bulletin No. 4831.

Electric Shock

By DR. S. JELLINEK.

The Electrician, Sept. 2, 1910.

The danger of an electric current depends on circumstances which might be placed in the following two categories:—

1. The external: (a) voltage, (b) amperage, (c) number of poles, (d) time of contact, and (e) the kind of current (direct or alternating). The direct current appears to be more dangerous than the alternating.

2. The individual: (a) the resistance of skin and body, (b) the path of the current through the body and over the surface of the skin, and (c) the condition of mind and body. With regard to 2, (a) the resistance of exit for the current is just as important as the resistance of entrance; as to 2, (b) the writer claims that the failure of American electrocution is most probably due to causes connected with the management of the poles, which are moistened, a great part of the current passing over the surface of the skin and thus not coming in contact with the organs of sensibility—the brain, the heart, etc. Under section 2 (c) there is an enormous difference between the touching of a current intentionally, the mind being prepared and ready for the shock, and doing it accidentally, in which latter case the shock being liable to produce an inhibition of the functions of important organs. Electricity passing through the body causes a psychological and a material action, and the result might be either disease or death. Local lesions or alterations of the skin sometimes take the form of genuine burnings and sometimes of so-called specific electric changes, the latter is painless.

In most cases death by electricity resembles suspended animation and between electric shock and death there is an interim of a few seconds by which the stricken person appears to be in quite a normal state. Everything depends on whether the heart action will be continued or not; and as there are sometimes hemorrhages in the brain and an increase in the pressure of the cerebro-spinal liquid, it is necessary and important in cases of first aid to lay the patient with the head elevated.

Why the Salesman Failed

He wasn't neat in his appearance.

He lacked dignity in his bearing.

He used no tact whatever in introducing himself.

He was late in keeping his appointment.

He had a conceited and arrogant manner.

He did not believe in his own proposition.

He disgusted his prospect with flattery.

He didn't know the fine points of his own goods.

He offended the prospect by undue familiarity.

He made bitter attacks upon his competitor's goods.

He openly ridiculed his prospect's ideas and methods.

He made no preliminary study of his prospect's case.

He relied on bluff, instead of solid argument based on facts.

He got lost in the forest of details and couldn't stick to essentials.

He talked too much—he gave his prospect no chance to explain his needs and position.

He couldn't answer questions and objections intelligently, concisely and convincingly. He tried to close with his prospect before he had worked him up to a point of conviction.

He lost his nerve because the prospect presented such an unyielding front, forgetting that battles are won by hard rallies at the finish.

He didn't know his business when he made the approach; didn't make it his business to fight all the way through, and didn't do business before he left.

The Bankers and Brokers Gazette.

A Great Game

Economy vs. Extravagance

By THOS. E. FOGALSANG, Electrical Superintendent, Station A, San Francisco.

T. F. Fogalsang

The world today, more so than at any other period in history, faces a crisis, and it is up to the people themselves to solve the problems connected with this crisis, as they alone will benefit by any solution that is brought about. Just as charity should begin at home, so should the forerunner of this solution have its beginning in the household, or better, still, by individual effort.

Each person knows for him or her self, that the cost of living is gradually going up. Why, they do not know, and perhaps it would be only a waste of mental strength for them to try to figure it out. Great students of Sociological conditions disagree as to the cause, so what is the use of lesser mortals dealing with subjects that Specialists cannot unite on. Naturally, as the Earth gets older and changes take place, its producing power must get less, just as a persons's does. The population of the earth, also increases, and with this increase, a greater demand upon the products of the earth.

On a piece of virgin soil, potatoes planted for the first time will yield an enormous crop, but if planted successive years the crops diminish in size and quality. This is so with every crop that is planted, and in Central California, where once existed the banner wheat producing section of the world, many farmers today, are lucky to get enough wheat for seed purposes, while the quality is such that the millers will not use it without mixing enough outside wheat with it to bring their flour up to the standard. Economy is the key to the solution of this vital problem of living. Economy in all things and extravagance in none. Extravagance means waste. Waste means want. Economy does not mean stinting. There are two extremes, either of which is bad.

Economy is as much a science as Astronomy, only it does not require a great scholar or student to be a successful economist. The workingman can and should be the greatest economist, as he, in time is benefitted the most. Extravagance is like any habit, it grows, and in time destroys the user. It was the love of luxury, and wasteful extravagance, that led to the downfall of the Roman Empire, the greatest of its time. Each person should strive to live within his means, and above all, waste nothing, therefore making it possible to eventually save something. Economy, practised on yourself, will teach you to be economical with the affairs of others, and vice versa; economy practised in your work for others, will show you how to save at home.

"Poor Richard" said, "Take care of the dimes and the dollars will take care of themselves." You cannot get rich at a single bound, and the fortunes that endure, are built upon the foundation of slow growth. If you are not an economist, start today to practice it and to teach it to others. It is the bulwark of all successful enterprises that last. Do not waste a single thing. Do not waste it because it is your employers and you did not pay for it; much less waste it because you paid for it and it is yours to do with as you please.

It Happened Out West

THE electric tram train was just pulling to the mouth of the tunnel that emptied the ore chutes from Level Five. Suddenly the motor came to a stand still, and the electric lights in the tunnel went out. The power was off. Charlie the Swede, motorman for Crew Three, dismounted from his seat, controller bar in hand, and with the two car dumpers, waited for the return of the mysterious fluid. Five, ten, fifteen minutes elapsed, and still it failed to show.

Superintendent Abbott, in his office at home, soon realized that something was wrong on the tram, for he no longer heard the thunderous roars of the ore falling into the bunkers below. Straightaway he took himself up the hill to the place where Crew Three was idly waiting.

"I say, what's the matter here?" "Why ain't you boys hauling out ore?" he asked.

"Its no 'uice," replied the Swede motorman, "Its no 'uice."

"Well why ain't it any use?" roared the now almost infuriated Overseer. "I want you to haul ore, and be quick about it, or down the hill you go."

"I tank we can't, its ban no 'uice," further explained the innocent Charles. The Superintendent was now thoroughly aroused. To think that a man in his employ should tell him that its no use to haul out ore, and the bunkers not yet half full. Surely the man must be a fool to even hint such a thing.

"Well I'll make it some use" he said. "I want ore hauled, and want it done quick," he emphasized with an oath.

Just then the lights in the tunnel flashed bright. The power was on.

"There's the 'uice now," said the motorman as he mounted to his seat, gave his controller a roll, and started his train, leaving the exasperated Superintendent to realize that what Charlie the Swede tried to say was: "There's no juice."

T. E. FOGALSANG.

From Electricity to Gas at the Premises of the Society of Medical Officers of Health

London Journal of Gas Lighting, Oct. 18, 1911.

The rooms of the society, formerly lighted by electricity being recently redecorated, it was decided to improve their lighting and general hygienic condition which had been previously unbearable. The problem was referred to the London Gas Light and Coke Company, which installed a gas heating and lighting system.

In the basement was placed a battery of three gas-heated hot-water boilers so arranged that any number could be used as circumstances required, each consuming 80 cubic feet an hour and supplying hot water to the radiators throughout the offices. One radiator is placed just inside the door of the meeting room in such a position that it will warm any air entering the room at that point. Between the windows in this room, of which there are three, are vertical shafts in each of which are three radiators placed one above the other. Air is drawn from out-of-doors into the bottom of the shaft by electric fans, filtered, and driven upwards over the radiators and out by a duct running across the ceiling of the room and containing narrow slits. Another fan exhausts the vitiated air. In addition to the means of ventilation just described, there is a five-light inverted ventilating lamp connected with an outlet duct and fitted with a figured, frosted globe and screen. The control of the lamp is by a tap near the door, at the side of which tap is a by-pass supply for a pilot light.

The secretary of the society reports that the results are entirely satisfactory.

Above the meeting room are two rooms for exhibition purposes, lighted by inverted gas lamps in place of the electricity heretofore used. These are controlled by the Telephos system.

PERSONALS

Mr. W. H. Kline, General Agent of the Company, together with Mrs. Kline, is spending a two weeks' vacation on Eel River, in the vicinity of Eureka, Humboldt County, visiting Mrs. Kline's brother, Senator Selvidge. Mr. Kline will return to the office about September 5th.

Mr. F. E. Oldis, head of the Bookkeeping Department of the San Francisco Company, will leave about September 9th for Cisco, in the Sierra Nevada Mountains, for two weeks' vacation, and will spend his time tramping the mountains and fishing in the Company's Lakes—Fordyce and Sterling, which are near Cisco.

Mr. C. F. Adams, Engineer of Electric Construction, has resigned his position with the Company as of September 1, 1911, and will be succeeded by Mr. J. P. Jollyman, who will carry the same title as that held by Mr. Adams.

Mr. Jollyman is no stranger to the employees of the Pacific Gas and Electric Company, he having been for a number of years an engineer in the Construction Department, and a number of the large generators and water wheels in the hydro-electric power houses throughout our system have been installed under the direct supervision of Mr. Jollyman.

He resigned his position with the Pacific Gas and Electric Company some time ago, and to within a short time has been the Superintendent in charge of the power plant of the Great Western Power Company on the Feather River, near Oroville.

The linemen in the North Tower Power Division have a mascot, whose picture is shown with this article. This young man is being educated and gradually developed into a first-class lineman. His name is Herman Dickman, and he is six years of age.

Herman Dickman

The picture represents one of his first lessons in pole climbing and line repairing. His home is in Petaluma, at the house where the linemen make their headquarters in that district, and he soon expects to be upon the Company's payroll as a permanent employee.

There are probably only a few out of the total readers of the PACIFIC GAS AND ELECTRIC MAGAZINE who are aware of the fact that we have within our midst a comedian

Herbert Wilson

who promises to become famous within a short time, through his characteristic Scotch impersonations along the same lines that have made Harry Lauder world-renowned.

Bert Wilson, stenographer in the office of the President, through his clever take-off of the "Hoot Mon," has found himself forcibly graduated from the amateur ranks into a professional.

On February 27th, 1911, he took part in a performance at St. Boniface's Auditorium, San Francisco; May 22d, 1911, at the Y. M. C. A. Hall, San Francisco; and June 2d, 1911, Maple Hall, Burlingame, which gained for him a call to display his talent in a professional way at Hyman's Theatre, Venice, near Los Angeles, during the week of July 18th, when on his summer vacation. Wilson made an immediate hit, and received the following write-up in the Venice *Daily Vanguard*: "Herbert Wilson, in the costume of a "Hoot Mon," gave an excellent impersonation of Harry Lauder, and his clever work was much appreciated. He has a very good Scotch dialect, and sings his songs extremely well."

Wilson promises that if he ever gets on the "all-star" circuit, all employees of the Pacific Gas and Electric Company will be entitled to free tickets. But will they get them?

R. J. C.

There has been a wave of excitement among the people of Auburn the past few days, occasioned by the finding of gold by men employed in digging ditches for the Pacific Gas and Electric Company, east of the railroad tracks. It is nothing uncommon for the men to dig up rocks studded with gold.

Redding Free Press, Aug. 17.

Liberties Taken With the Alphabet

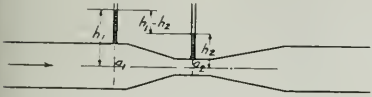
"A" stands for Adams of engineering fame.
"B" for Bostwick, who plays the secretary game.
"C" for Cantrell, the genial property man.
"D" for Downing, a famous baseball fan.
"E" for Eskew, the power house superintendent.
"F" for Florence, now in Redwood District.
"G" for Grover, his specialty is gas.
"H" for Henderson, also in that class.
"I" for Ike Adams of De Sabla Power.
"J" for Jones, the gas engineer of the hour.
"K" for Kuster, the king of San Jose.
"L" for Love, who sports a choice nosegay.
"M" for McKillip, Elec., Gas and Railroads.
"N" for Newbert, now handling gas stoves.
"O" for Osborn, who hailed from Woodland town.
"P" for Poingdestre, who walks the levies round.
"Q" for Quigley, on the San Francisco side.
"R" for Robb, the scrap heap is his pride.
"S" for Scarfe, who does the auto stunts.
"T" for Thompson, who Electrical Distribution bunt
"U" for "Uncle Bill," otherwise known as Kline.
"V" for Varney, who keeps steam up all the time.
"W" for Weber, who raises chickens with gas.
"X" is so odd we are forced to pass.
"Y" for Young, who handles hot lines.
"Z" for Zero, and the end of these rhymes.

QUESTION BOX

Ask questions. Any one of the several thousand men and women in the Pacific Gas and Electric Company who wishes information pertaining to any phase of the company's work or concerning matters of common interest to residents of any section reached by the company's lines is urged to use this department freely. Send your questions to the magazine. There will be no charge.

Question.—What is the working principal of the Venturi water meter?

Answer.—The Venturi meter consists of a contracted section installed in a pipe line by means of two adjacent sections in the form of truncated cones, and fitted with a device for determining the difference in pressure at the contracted section and a point immediately above, as shown in diagram.



Let the discharge which it is desired to measure be represented by Q. Since this quantity *must* pass all sections of the pipe of whatever size and be equal to the velocity of flow multiplied by the area of the cross section, we have:

$$Q = a_1\ v_1 = a_2\ v_2 \ \ldots\ldots\ldots\ldots \quad ..(1.)$$

a_1 and ${}_2$ being the areas, and v_1 and v_2 the velocities of the upper and lower section, respectively:

The effective head at the upper section is, $h_1 + \frac{v_1^2}{2g}$ and at the contracted section, $h_2 + \frac{v_2^2}{2g}$, in which "g" is the acceleration due to gravity = 32.3 ft. per second.

With the meter in a horizontal position, if we neglect friction between the two sections these two expressions for effective head are equal, and,

$$2g\ (h_1 - h_2) = v_2^2 - v_1^2$$

$$\text{But from } (1.)\ v_2 = \frac{Q}{a_2}$$

$$\text{and } v_1 = \frac{Q}{a_1}$$

$$\text{Substituting } 2g\,(h_1 - h_2) = \frac{Q_2\,(a_1^2 - a_2^2)}{a_1^2\ a_2^2}$$

$$Q = \sqrt{a_1^2 - a_2^2}\ \sqrt{2g\,(h_1 - h_2)}$$

Since we know the dimension of our meter, a_1 and a_2 and can measure directly the value of $(h_1 - h_2)$ under any condition of flow, we have all the quantities necessary to compute the values of the discharge Q.

A. L. T.

Question.—Some constant-current, series street light systems operate at 7.5 amperes, others at 6.6, others as 4.3. Why the difference? Why not have a standard, say, of 6.6 amperes.

Answer.—If a constant current of 6.6 amperes standard were adopted for series systems, it would not be possible to use higher candlepower lamps, such as are used with the 7.5 ampere lamp. Also, in practice it is very often not economical to use high-ampere-capacity lamps on account of the excessive line loss that would be occasioned. The line loss varies as the square of the current. Also, the cross-section of wire that it is necessary to use will be larger with a high-ampere lamp than with a low-ampere lamp.

Question.—What nozzle pressure (pounds per square inch) is desired for fire protection in a town having no buildings higher than three stories; size of stream at discharge point of nozzle, 1⅛?

Answer.—From 30 to 40 pounds pressure will be necessary to accomplish the above, presuming that a smooth bore nozzle is used.

Question.—Is it possible, in heating water for small buildings, by means of steam circulated through coils, to obtain any desired constant temperature of the water?

Answer.—Accurately speaking, no. While many thermostatic valves have been developed for this purpose, none of them are sufficiently accurate to regulate within less than 20 or 30° F., and even these are unreliable.

Question.—What causes the knocking or hammering so often met with in steam heating systems?

Answer.—This hammering is usually due to water which has been held in the radiators or piping. Either the system is improperly designed to allow for the return of the condensation, or the air valves on the radiators are not operating properly.

PACIFIC GAS AND ELECTRIC COMPANY

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D. H. Foote
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H. Bostwick	Secretary to President	J. P. Jollyman	Engr. of Electric Construction
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Chico	H. B. Heryford	Petaluma	H. Weber
Colusa	L. F. Hartsock	Redwood City	E. W. Florence
Dixon	C. E. Sedgwick	Sacramento	C. W. McKillip
Fresno	W. M. Henderson	San Jose	J. D. Kuster
Grass Valley	John Werry	San Rafael	W. H. Foster
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Nevada (Nevada City)	George Scarfe	Standard (Electra)	W. E. Eskew
Stockton (Stockton)	J. W. Hall		

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Electra	W. E. Eskew	San Jose	J. O. Hansen
Marysville	C. E. Young	South Tower	A. H Burnett
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SUPERINTENDENTS OF GAS DISTRIBUTION

Oakland	George Kirk	San Francisco	W. R. Morgan

THE PACIFIC GAS AND ELECTRIC COMPANY

SUPPLIES HEAT, LIGHT AND POWER TO

Place.	Population.
Agua Caliente	50
*Alameda	23,383
**Albany	800
‡Alta	200
Alto	30
Alvarado	200
Allegheny	200
‡Amador	200
Angels Camp	3,200
Antioch	3,000
‡Auburn	2,376
Baden	1,500
Barber	200
**Belmont	600
Belvedere	481
Benicia	3,360
Ben Lomond	800
**Berkeley	40,434
Bethany	200
Big Oak Flat	150
Biggs	750
Bohemian Grove	25
Brentwood	200
Brighton	100
Broderick	500
‡Brown's Valley	50
**Burlingame	5,000
Byron	200
Campbell	1,000
Camp Meeker	200
Cement	1,500
Centerville	500
‡Centerville	20
**Chico	13,000
Chittenden	50
**Colusa	1,582
‡Colfax	400
**Colma	500
Concord	1,500
Cordelia	150
Corte Madera	350
Cordova	25
Cornwall	300
Crockett	2,500
Crow's Landing	375
Davenport	1,000
‡Davis	750
Decoto	350
‡Dixon	1,000
Dobbins	50
‡Drytown	100
Duncan Mills	150
Durham	500
‡Dutch Flat	400
Eagle Nest	50
‡East Auburn	1,500
**Easton	500
**East San Jose	1,500
Eckley	20
Eldridge	1,000
‡Electra	50
Elmira	150
El Verano	100
Emerald	50
**Emeryville	2,000
Encinal	20
Fairfax	250
Fairfield	800
**Fair Oaks	250

Place.	Population.
Felton	300
Folsom	1,500
Forestville	100
*Fresno	24,892
Gilroy	2,000
Glen Ellen	500
‡Gold Run	100
Grafton	350
†Grass Valley	4,520
Gridley	1,800
Groveland	50
Guerneville	500
Hammonton	500
**Hayward	4,000
Hollister	3,000
Ignacio	50
‡Ione	900
Irvington	1,000
‡Jackson	2,035
‡Jackson Gate	50
Kennedy Flat	50
**Kentfield	200
Knight's Landing	350
Larkspur	594
Lawrence	100
‡Lincoln	1,402
Live Oak	200
Livingston	200
Livermore	2,250
‡Loomis	150
Los Altos	200
Los Gatos	3,000
Manlove	50
Mare Island	500
‡Martell	25
Martinez	5,000
**Marysville	5,430
Mayfield	1,500
Mayhew	50
**Menlo Park	1,500
Meridian	300
Middle River	75
Mill's College	150
**Milbrae	300
Mills	350
Mill Valley	2,551
Mission San Jose	500
Mokelumne Hill	150
Monte Rio	50
Mountain View	2,500
**Napa	5,791
Napa Junction	250
†Nevada City	2,689
Newark	700
‡Newcastle	600
New Chicago	25
Newman	1,000
Niles	800
Novato	250
**Oakland	225,000
**Oak Park	8,000
Occidental	400
Ophir	50
Oroville	2,500
Orwood	50
Oswald	25
Pacheco	200
**Palo Alto	6,000

Place.	Population.
Patterson	100
Penon Blanco	25
‡Penryn	250
Perkins	200
**Petaluma	5,880
**Piedmont	2,000
Pike City	200
Pinole	1,500
Pittsburg	2,200
Pleasanton	2,000
Port Costa	600
**Redwood City	3,500
**Richmond	6,802
Rio Vista	884
‡Rocklin	1,026
Rodeo	100
‡Roseville	2,608
**Ross	556
Routier	30
***Sacramento	52,000
San Andreas	200
**San Anselmo	1,531
**San Bruno	1,500
**San Carlos	100
**San Francisco	416,912
**San Jose	40,000
San Juan	150
**San Leandro	4,000
**San Lorenzo	100
**San Mateo	7,000
San Pablo	1,000
**San Quentin Prison	1,600
**San Rafael	5,934
Santa Clara	8,000
Santa Cruz	11,146
**Santa Rosa	7,817
Saratoga	200
Sargent	50
Sausalito	2,383
**Sebastopol	1,233
Selby	100
Smartsville	300
Sonoma	1,200
**So. San Francisco	2,500
Stanford University	2,000
**Stege	100
‡Stockton	23,253
Suisun	1,200
Sunnyvale	2,000
‡Sutter Creek	2,000
Terminus	50
Tiburon	100
Tormey	150
†Towle	200
Tracy	1,200
Vacaville	1,177
**Vallejo	11,340
Vallejo Junction	10
Vernalis	50
Vineburg	200
Walnut Creek	850
Warm Springs	200
Watsonville	4,446
Wheatland	1,400
Winters	1,200
**Woodland	3,187
Yolo	350
**Yuba City	1,160

*—Gas	48,275
**—Gas and Electricity	847,139
‡—Electricity and Water	41,445
***—Gas, Elec. and Street Car Service	52,000
†—Electricity, Gas and Water	7,409
Unmarked—Electricity only	115,307
	1,111,575

Service Furnished.	Number of Towns.	Total Population.
Electricity	204	1,062,866
Gas	52	946,328
Water	20	42,894
Street Car	1	52,000

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½ the size of all the New England states combined

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SAN FRANCISCO NEW YORK

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Published Monthly by
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SAN FRANCISCO

VOL. 3 OCTOBER, 1911 NO. 5

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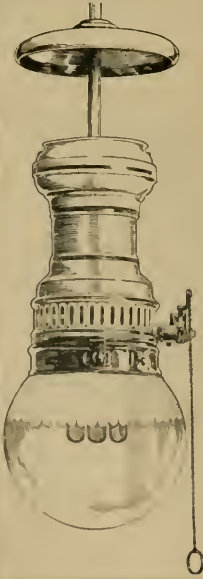

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Pacific Gas and Electric Magazine

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THE UNIVERSITY LIBRARY

CALIFORNIA HALL

PACIFIC GAS AND ELECTRIC MAGAZINE

VOL. III OCTOBER, 1911 No. 5

The University of California

By JOHN A. BRITTON, Vice-President and General Manager, Pacific Gas and Electric Company.

WHERE lives the white race, there also, must there be education. It matters not how barren may be the wilderness, wherever men meet and a nucleus is formed, whether a mere camp or the forerunner of a town or big city, intelligent, educated minds, though they may have lain dormant for a time, and been clothed in a rough exterior, forge to the top and front, and demand the rights of civilization; the right to educate their children, and even where the conditions have made advancement almost prohibitive, these strong dominant spirits have carved the way. They have builded their school houses, they have provided them with teachers and fostered and protected them until they have taken on a permanent and healthy growth, and become a blessing to the community and a help to mankind.

Such were the conditions in California in early days, when all was new and an unsettled state existed. But, nothwithstanding, and although schools of lesser degree had been established, a demand existed for greater proficiency, and an opportunity to afford the next generation—the hardy offspring of the early pioneers—a chance to climb to a higher plane than could be reached through a common school education. With this lofty ideal in mind, there was proposed and carried to successful accomplishment, an institution that has grown and endured from a small beginning into one of the world's greatest educational centers; a monument to those intrepid spirits who planted the first seed and to those who have cultivated and nursed it onward and upward to its present stage of near-perfection and renown.

The following information regarding the University of California is taken from the various publications issued by the University from time to time, to which acknowledgment is hereby made.

The establishment of the University came as the resultant of three movements: one originating in private initiative, one in State action, and one in Federal action.

In 1853 Rev. Henry Durant, a native of Massachusetts and a graduate of Yale College, class of 1827, landed in San Francisco. He came with the purpose of founding a university fully formed in his mind. In that same year, under the auspices of the Presbytery of San Francisco and of the Congregational Association of California, Mr. Durant opened the "Contra Costa Academy" in Oakland. The name was shortly afterwards changed to "College School, and was incorporated in 1855 under the name of the "College of California." A suitable site had already been secured in Oakland. Rev. Samuel H. Willey, who had come to California in 1849, and had constantly agitated the subject of founding a college, was appointed vice-president; no president was selected. In 1859 three professors, Henry Durant, Martin Kellogg, and I. H. Brayton, together with three instructors, were chosen as the faculty of the college, and in 1860 instruction was formally begun with a freshman class of eight students. Classes were graduated from 1864 to 1869, inclusive.

In 1856 a tract of one hundred and sixty acres, five miles north of Oakland, was selected as the permanent home of the college; in 1860 this spot was formally dedicated to the purposes of education; and in 1866, on the suggestion of a member of the board of trustees, Frederick Billings, the name of Berkeley was given to the townsite.

The Constitutional Convention of 1849 inserted in the fundamental law a provision that the legislature should encourage the promotion of the intellectual, scientific and moral improvement of the people. To accomplish this end the constitution placed at the disposal of the legislature: (1) the five hundred thousand acres of land, which had been granted by Congress for the purposes of internal improvement, and devoted by the constitution of California to the cause of common school education; (2) all escheated estates; (3) the sixteenth and thirty-sixth sections of land, granted by Congress, and constituting one-eighteenth portion of all the soil of the State. The constitution directed that these benefactions should remain a perpetual fund to be "inviolably appropriated to the support of common schools throughout the State.

From 1849 to 1868 the matter of establishing the University of California in one form or another was constantly agitated. In 1853 Congress gave to the State forty-six thousand and eighty acres of land for a "seminary of learning." In 1862 the Morrill Act granted to the several States a quantity of public land. The apportionment of this grant for California was one hundred and fifty thousand acres. In order to secure the endowment, an act was passed by the legislature in 1866 to establish an Agricultural, Mining and Mechanical Arts College, and to provide a board of directors therefor. The directors provisionally selected a site of one hundred and sixty acres a little to the north of the Berkeley grounds of the College of California.

During the year 1867 a group of men, deeply interested in the intellectual advancement of California, including Rev. Dr. Horatio Stebbins, Professor Durant, Governor F. F. Low, John W. Dwinelle and John B. Felton, sought to secure the establishment of an institution of broader scope than the projected State College of Agriculture, Mining and Mechanical Arts. Their efforts resulted in the generous offer to the State on the part of the College of California of its property in Oakland and its grounds in Berkeley on condition that the State should "forthwith organize and put into operation upon the site at Berkeley a University of California, which shall include a College of Mines, a College of Civil Engineering, a College of Mechanics, a College of Agricul-

The Mechanical and Electrical Engineering Building

ture, an Academical College, all of the same grade and with courses of instruction at least equal to those of eastern colleges and universities."

In 1869 the College of California discontinued its work of instruction and gave place to the new University, which opened its doors on September 23. During the construction of buildings at Berkeley the University occupied the college halls in Oakland. On July 16, 1873, the commencement exercises were held at Berkeley and the University took formal possession of its new home.

The first appointees to the faculty included Professors Martin Kellogg, John LeConte, and Joseph LeConte. The first appointee to the presidency was Professor Durant. When in 1872 he resigned, owing to failing health, he was succeeded by Daniel Coit Gilman.

In 1869 the legislature directed that no admission or tuition fees should be charged, and in 1870 that the University should be opened to women on terms of equality with men. This latter legislative provision was re-enforced in 1879 by the express constitutional declaration that "no person shall be debarred admission to any of the collegiate departments of the University on account of sex."

President Gilman resigned in 1875 to accept the presidency of the new Johns Hopkins University in Baltimore. He was followed by John LeConte, who served until 1881, when William T. Reid was elected to the position and served until 1885. Edward S. Holden was then elected, with the understanding that he was to fill the presidency only until the completion of the Lick Observatory, when he was to assume the position of its director. Accordingly he retired in 1888 and was succeeded by Horace Davis, who served for two years. Thereafter Martin Kellogg was acting president until, in 1893, he was formally appointed to that office. Upon his resignation in 1899 he was succeeded by President Benjamin Ide Wheeler.

Until 1887 the University depended for its revenue upon the income from its invested funds and upon biennial appropriation by the legislature. Its invested capital consisted of money derived from the sale of seventy-two sections of land for a seminary of learning and ten sections for public buildings, both granted by Congress in 1853; from the sale of one hundred and fifty thousand acres granted under the Morrill Act of 1862; from the sale of salt and marsh lands granted by the legislature; and from the sale of the College of California property in Oakland.

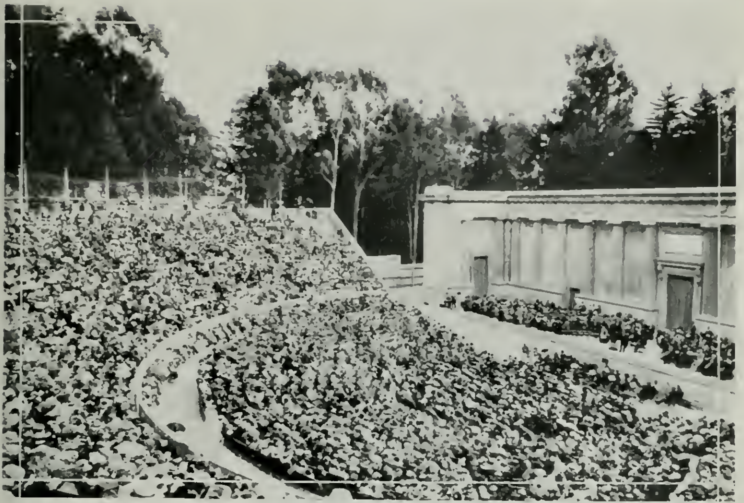
In 1887 the State legislature rendered the income of the University more secure and permanent by providing for the annual levy of an *ad valorem* tax of one cent on each one hundred dollars of the taxable property of of the State. In 1897 the resources were further enlarged by a second act of the legislature, providing for the levy of an additional one cent on each one hundred dollars. In 1911, as an incident of an amendment to the Constitution which reorganized the tax system of the State; the legislature substituted for the "three cent tax" a bill appropriating for university support the sum of $760,770 for the year ending June 30, 1912, with provision for a regular increase of seven per cent. per annum in this appropriation for three yeears thereafter, or until June 30, 1915, for which year the income will be $931,974.

In 1896 a proposition looking to a general building scheme was made by Mr. B. R. Maybeck, instructor in architectural drawing, and was introduced in the Board of Regents and fostered there by Regent J. B. Reinstein. The board voted to have prepared a programme "for a permanent and comprehensive plan to be open to general competition for a system of buildings to be erected on the grounds of the University of California at Berkeley." Before this resolve had been put into effective operation it came to the notice of Mrs. Phoebe A. Hearst, who was then considering the erection of a building at the University in memory of her husband, the late Senator George Hearst. Accordingly, Mrs. Hearst at once wrote to the board expressing her desire to promote the proposed competition and defray all the expenses. This offer was gratefully accepted.

Two competitions were held, a preliminary one at Antwerp, and a final one at San Francisco. The preliminary competition opened January 15 and closed July 1, 1898. Of one hundred and five plans presented eleven were selected by the jury for the final contest. The second contest, in San Francisco, resulted in the award of first prize to Monsieur Emile Bénard of Paris; second prize, Messrs. Howells, Stokes and Hornbostel of New York; third prize, Messrs. D. Despradelle and Stephen Codman of Boston; fourth prize, Messrs Howard and Cauldwell of New York; fifth prize, Messrs. Lord, Hewlett and Hull of New York.

To adapt and carry out the Bénard plan the Board of Regents appointed Mr. John Galen Howard supervising architect of the University. The first structure completed in execution of this plan was the Greek Theatre, the gift of Mr. William Randolph Hearst. The Greek Theatre is an open-air auditorium of unique beauty, lying in the hollow of the hills and surrounded with trees. It is used for great university occasions, and for musical and dramatic representations. The second building to be completed in accordance with the Hearst plans was California Hall, a solid granite structure erected through appropriations made by the State legislature. The third building in this scheme is the Hearst Memorial Mining building, the cornerstone of which was laid on November 19, 1902, and the formal opening celebrated on August 25, 1907. A fourth building, the University Library, provision for which was made in the will of the late Charles Franklin Doe of San Francisco, was first occupied in June, 1911. The Boalt Memorial Hall of Law, the fifth building of the series, was formally opened on April 28, 1911. This building is the gift of Mrs. Elizabeth Boalt, widow of the late John H. Boalt of San Francisco. The Hall of Agriculture, the sixth building of the series, is now in course of construction. The Sather Gate and bridge at the Telegraph avenue entrance to the campus, provided by the generosity of Mrs. Jane K. Sather, was completed in 1910. A president's house and central heating station have likewise been erected.

Beginning in 1891 the University has con-



Greek Theatre

stantly aimed to extend the benefits of its instruction in agriculture farther and farther beyond its own confines. In the year named the custom of holding Farmers' Institutes throughout the State was begun. So important had this work become that, in 1897, a new department was created, a Department of University Extension in Agriculture. Through these institutes, through bulletins, and through professional visits to farm, garden, orchard, and vineyard, the University constantly stands ready to render aid, advice, and instruction to relieve agricultural emergencies and solve agricultural problems in the State. The acquisition of the farm of seven hundred and seventy-nine acres at Davis, Yolo County, has greatly enlarged the scope of the University's work in agriculture.

Summer schools in several departments were annually held for a number of years up to 1899, when the work was systematically organized and a summer school of general scope for the first time held. It has met a great public demand and has been largely attended, not only by teachers of California, but by special students from all parts of the country. A marked feature of the summer sessions at Berkeley, and an important element of the University's policy in that regard, is the presence as lecturers of leading men from the Eastern and European Universities.

ADMINISTRATION

The government of the University of California is intrusted to a corporation styled The Regents of the University of California, consisting of the Governor, the Lieutenant-Governor, the Speaker of the Assembly, the State Superintendent of Public Instruction, the President of the State Board of Agriculture, the President of the Mechanics' Institute of San Francisco, and the President of the University, as members *ex officio*, and sixteen other regents appointed by the Governor and approved by the Senate. To this corporation the State has committed the administration of the University, including management of the finances, care of property, appointment of teachers, and determination of the internal organization in all particulars not fixed by law.

The instruction and government of the students are intrusted to the Faculties of the several colleges and to the Academic Senate.

The Faculty of each college consists of the President of the University and those professors and instructors, and only those, whose departments are represented in it by required or elective studies.

The principal seat of the University is at Berkeley, a city of about 43,000 inhabitants, on the eastern shore of San Francisco Bay directly opposite the Golden Gate. It is thirty-five minutes' ride by train and ferry from San Francisco and twenty-five minutes' ride by electric car from the business center of Oakland. The site of the University comprises about five hundred and twenty acres, rising at first in a gentle and then in bolder slopes from a height of about two hundred feet above the sea level to one of nearly nineteen hundred feet. It has a superb outlook over the bay and city of San Francisco, over the neighboring plains and mountains, the ocean, and the Golden Gate.

The climate of Berkeley is exceptionally well suited for uninterrupted university work throughout the year. The weather during the month of August is generally cool, so that it is possible to begin the academic year earlier than in Eastern universities, and thus divide it at the Christmas holidays into two equal half-years. Commencement is held about the middle of May.

Berkeley is a healthful locality; the slope of the town site makes perfect drainage possible; the climate is at once mild and invigorating. The thermometer rarely mounts above 75°. With high temperatures the humidity is invariably low, so that the heat is not oppressive. Heat prostrations are practically unknown. Very low temperatures are never reached. Within the last twenty years the lowest recorded temperature was 24.9°. A very slight fall of snow occurs about every eight or nine years. At such times the snow barely covers the ground and disappears within a few hours. The mean temperature during the winter months is about 48°.

The rainy season is well defined, and extends from December to March, inclusive. A characteristic feature of this season is that rain will fall for three or four days in succession, after which there will follow a week or more of fair weather. There may be light rains in October, November, and April.

From April to September of each year the winds are from the west and southwest; i. e., from the Pacific Ocean. They are cool and damp, and seldom have a velocity of more than fifteen miles an hour. During the remainder of the year, the same general conditions prevail, except that occasionally there is a strong northwest wind, rather cool, or a strong northeast wind, dry and warm.

FOUR-YEAR COURSES

There are established at Berkeley nine colleges, in each of which there is an undergraduate curriculum of *four years*, leading directly, under conditions hereinafter stated, to a corresponding degree, namely:

The Colleges of General Culture—
  to the degree of A. B. in the College of Letters,
  to the degree of B. L. in the College of Social Sciences,
  to the degree of B. S. in the College of Natural Sciences,

The Colleges of Applied Science—
  to the degree of B. S.
    in the College of Commerce,
    in the College of Agriculture,
    in the College of Mechanics—
      (1) in mechanical engineering, or
      (2) in electrical engineering,
    in the College of Mining,
    in the College of Civil Engineering—
      (1) in railroad engineering, or
      (2) in sanitary engineering, or
      (3) in irrigation engineering,
    in the College of Chemistry.

Students in Architecture, although pursuing an established curriculum in part comparable with that of a college of applied science, are classified as students in Letters, Social Sciences, or Natural Sciences, and are subject to the requirements for matriculation and for the Junior Certificate in these colleges.

FIVE-YEAR COURSES

In the Colleges of Mechanics, Mining, Civil Engineering, and Chemistry, there are also courses of *five years*, leading, as do the four-year courses, to the degree of Bachelor of Science, but providing a broader cultural and professional training than is possible in the four-year courses. In the five-year course in Mining, provision is made for specialization, either in (1) mining, or (2) metallurgy, or (3) geology.

OTHER UNDERGRADUATE COURSES AT BERKELEY

The work of the first two years of the College of Medicine is given at Berkeley; the work of the last two years is given at the San Francisco Department of the College of Medicine, in San Francisco, or at the Los Angeles Department in Los Angeles.

ADMISSION

Applicants for admission to regular undergraduate courses at Berkeley must be at least sixteen years of age, must give satisfactory references concerning moral character, and must, by examination or by certificates which shall be satisfactory to the faculties, give evidence of proficiency in such of the subjects as are designated below as required for the college and status sought. Applicants must also appear before the University medical examiners and pass a satisfactory physical examination, to the end that the health of the University community may be safeguarded.

HARMON GYMNASIUM

This gymnasium, presented to the University by the late A. K. P. Harmon, is well equipped, and provides all male students with opportunities for physical culture. Besides the main hall and athletic quarters, there are 167 shower-baths, and 2000 steel lockers for the use of the students.

The exercises in the gymnasium are conducted systematically under the supervision of the Professor of Physical Culture.

Football Statue

HEARST HALL

Hearst Hall was presented to the Univercity by Mrs. Phoebe A. Hearst for a Women's gymnasium. It contains the best of modern equipment, with special facilities to correct physical defects. Connected with the gymnasium are eighty-nine shower-baths, supplied with hot and cold water, one hundred and seventy-eight dressing rooms, and nine hundred lockers for the exclusive use of women students. The lower hall is used as a general gathering place for the women of the University.

Connected with the gymnasium is an enclosed court 150 feet long and 80 feet wide, with a seating capacity of one thousand, also the gift of Mrs. Hearst. It is used as an outdoor gymnasium, as well as for basket-ball and other games suitable for women.

LIBRARY, MUSEUMS, AND LABORATORIES

The General Library, housed in the newly completed building, provided for by the bequest of the late Charles F. Doe, now contains over 215,000 volumes. It is constantly augmented by donations and exchange, and by large purchases of books with the income from the Michael Reese, James K. Moffitt, Jane K. Sather, E. A. Denicke, and other funds.

The collections in classical archaeology comprise many original pieces of Greek, Etruscan, and early Italian material.

The classical exhibits of the Phoebe A. Hearst Collections, have been incorporated in a Museum of Anthropology, located at the Affiliated Colleges, in the building formerly known as the Hastings College of Law, and was thrown open to the public for the first time on the fourth day of October, 1911. This collection represents a value of between four and five millions of dollars.

The formal opening of this museum was made the occasion of a reception to a large number of notable guests, including representative business and university men, and leaders of society of the Bay Cities.

Mrs. Hearst, assisted by President Benjamin Ide Wheeler and the Regents of the University of California, received the guests on the second floor of the museum. Large clusters of yellow chrysanthemums and autumn leaves of brilliant hue, specially featured in the decorations, assisted largely in making the inauguration ceremonies a very pleasant event.

LABORATORIES

The Psychological Laboratory is well equipped for instruction and for research. The entire second and third floors and part of the basement of the Philosophy Building are set apart for this use. The laboratory contains a demonstration room furnished for class instruction, which can be darkened when necessary, and an office also used for conferences. For research and special demonstrations there is an optical room, provided with north light; a special dark room, which may also be used as a silent room, being protected with double walls, floors, and doors; an acoustical room, with a specially devised contrivance for the direct transmission of sound to the silent room; and three other rooms, which can be adapted to any special problems. In addition to these, there is an apparatus room, a photographic room, a battery room, and a shop in which those working in the laboratory can construct the simpler contrivances for special research.

Besides its own batteries, the laboratory is connected with the central electric powerplant of the University; and a switchboard having terminals of from four to eight wires in each of the above rooms makes electric power from either source available in any part of the laboratory. In addition to this, an independent circuit provides light throughout the building.

The Zoological Laboratories occupy the greater part of the first floor and part of the second of East Hall. The laboratories, both for elementary and advanced work in general morphology, microscopical anatomy, and embryology, are large and well lighted.

Mechanical and Electrical Laboratories. The Mechanical and Electrical Engineering Building contains the laboratories of steam engineering, hydraulic engineering, and electrical engineering. The equipment of these laboratories is unusually complete in all departments of experimental engineering.

The Machine Shops have, in the aggregate, a floor area of 6,000 square feet and comprise the following:

1. The main machine room, fully equipped with metal working machines, and with bench and hand tools.

2. The wood working, carpentry, and pattern rooms, which contain a complete equipment of wood working machines and tools.

3. The blacksmith room.

4. A room for delicate metal work, especially equipped with the finer machines and tools for the construction of special instruments.

Much of the apparatus for use in the laboratories is from original designs, and has been constructed entirely in the machine shops.

The mechanical engineering laboratories contain a number of experimental steam engines, gas engines, and an air compressor, including condensers, hot wells, and apparatus and instruments for obtaining quantitative results in steam and gas engine experiments. Two water tube, high pressure boilers, having an aggregate capacity of 300 horsepower, are available for experiments in the generation of steam, these boilers being equipped with oil-burning furnaces.

In electrical engineering, the dynamo laboratory contains a 100 horsepower Ball engine which is used to drive through a countershaft electrical generators of various types. In addition, there is a 50 horsepower Straight Line engine which may be belted to alternating or direct current generators as desired. For constant speed, a 100 horsepower, 4,000 volt, 3 phase, synchronous motor, directly connected to a countershaft, is available for the driving of smaller alternating and direct current generators. When a variable speed is desired for tests, current is available from the central power station on the south side of the campus and the electrical machinery is driven by motors. The machines in the dynamo laboratory range in size from 100 kilowatts down. Direct current, constant potential and constant current types, and single and polyphase alternating current generators, and induction and synchronous motors are all represented in this laboratory, including many dynamo electrical machines constructed by students in the machine shops. Dynamometers of various types are used for efficiency tests. The multiple plug switchboards, of which there are four, may be used either for alternating or direct current and contain in all more than 2,000 terminals.

These switchboards are connected with the machines and also with the instrument table, so that tests may be readily and accurately conducted.

These switchboards are connected with the machines and also with the ammeters, voltmeters and wattmeters. A special bank of transformers for the transformation of polyphase currents, including single, 2 phase, 3 phase and 6 phase current, is connected permanently with the alternating current switchboard, the aggregate normal rating of the transformers being 100 kilowatts. For high voltage and insulator tests a 10 kilowatt, 100,000 volt, oil-insulated transformer is used.

The standardizing laboratories contain Kelvin Electric Balances, electro-static voltmeters, Weston laboratory standard ammeters and voltmeters, Wheatstone and Nalder bridges, and a full equipment of dead-beat astatic galvanometers.

In connection with the photometric and other experiments requiring a constant potential, a storage battery of 60 cells is available. The instrument rooms are all supplied with solid masonry piers for the mounting of sensitive instruments.

The hydraulic laboratory has recently been fully equipped. An artificial head of water is available for tests upon impulse wheels. Two experimental water wheels, each of 50 horsepower capacity, with interchangeable buckets and completely equipped with absorption dynamometers, are available for efficiency tests. A stand-pipe, giving various heads up to 60 feet, is used for experiments requiring constant heads. The laboratory equipment includes a number of standard weirs for the accurate measurement of water used in the tests of water wheels, turbines or the discharge from centrifugal pumps under test.

Civil Engineering Equipment. The department has an excellent assortment of models and specimens of trade products. It has a museum of engineering materials and apparatus; also a department library containing engineering reports and specifications of actual work, trade catalogues, and a large assortment of photographs and blue prints of existing European and American structures. These collections may be consulted by students and instructors. They are also drawn upon for illustration in the class room. A collection of photographic lantern slides of engineering structures is in use by the department and represents mainly the fields of structural engineering, foundations, testing of materials, railroading, sanitation, irrigation, roads and pavements, surveying and masonry structures.

For the purposes of instruction in the regular session at Berkeley and at the Summer School of Surveying held near Santa Cruz, the department has a supply of surveying and geodetic instruments. It also has a collection of drawing and computing instruments such as planimeters, specialized slide rules and railroad curves, for the use of upper division students.

Civil Engineering Laboratory. The Testing Laboratory is fitted with apparatus to determine the elasticity and resistance of the materials used in engineering construction and for the inspection of cements and manufactured products. Testing machines of large capacity are available for practical tests of beams and columns. Facilities are offered for original investigation of the physical properties of the materials of engineering. The laboratory is provided with a well-equipped machine shop for shaping test specimens of metal or wood and for the manufacture of special apparatus. Materials and building stones of the Pacific Coast receive special attention in the laboratory.

The Affiliated Colleges

The following is a list of college men—former students of the University of California—now in the employ of the Pacific Gas and Electric Company:

NAME	CLASS YEAR	DEGREE OR TIME	WHERE EMPLOYED
W. E. Osborn	1880	Ph. B.	Woodland
C. E. Sedgwick	1893	B. S.	San Francisco
J. U. Smith	1894	B. S.; M. S. 1899	San Francisco
Charles J. Nelson	1898	B. S.	Oakland
Clarence D. Clark	1899	B. S.	North Tower
R. J. Brower	1900	B. S.	Oakland
John O. Hansen	1902	B. S.	San Jose
R. J. O'Connell		(3 years)	Construction Department
H. C. Vensano	1903	B. S.	Construction Department
James H. Wise	1903	B. S.	San Francisco
E. L. Lord		(4 years)	Construction Department
Stanley V. Walton	1904	B. S.	San Francisco
Wallace H. Foster	1904	(1 year)	San Rafael
G. S. Johnson	1904	B. S.	San Francisco
C. H. Warren	1904	B. S.	San Francisco
John Spencer	1906	B. S.	Construction Department
H. T. Graves	1907	B. S.	Sacramento
I. C. Steele	1909	B. S.	Construction Department
W. Taylor	1911	(1 year)	San Rafael
H. G. Howard	1912	(1 year)	Oakland
W. B. Barry		(.2½ years)	San Francisco
John D. Kuster		(Summer School)	San Jose
P. A. Thompson			Oakland
C. T. Carr		(4 years)	Construction Department
G. C. Noble	1902	(B. S)	Engineering Department
R. C. Mixer	1909	(B. S)	San Francisco
R. G. Clifford	1905	B. S.	Engineering Department
James N. Barry	1910	B. S.	Sacramento
G. H. Middleniss	1910	B. S.	Sacramento
C. A. Gaines	1903	B. S.	San Francisco
John A. Britton, Jr.	1912	(3 years)	San Francisco
Raimon F. Conlisk	1912	(1 year)	San Francisco

The Bravest Battle Ever Fought

The bravest battle that ever was fought,
Shall I tell you where and when?
On the maps of the world you will find it not;
'Twas fought by the mothers of men.

Nay, not with cannon or battle shot,
With sword or nobler pen;
Nay, not with eloquent word or thought
From the mouths of wonderful men.

But deep in a walled-up woman's heart—
Of woman that would not yield,
But bravely, silently bore her part—
Lo! there is that battlefield.

No marshaling troops, no biouvac song,
No banners to gleam and wave!
But, oh! these battles they last so long—
From babyhood to the grave.

Yet faithful still as a bridge of stars,
She fights in her walled-up town—
Fights on and on in the endless wars;
Then silent, unseen, goes down!

O ye with banners and battle shot
And soldiers to shout and praise!
I tell you the kingliest victories fought
Are fought in these silent ways.

O spotless woman in a world of shame!
With splendid and silent scorn,
Go back to God as white as you came,
The kingliest warrior born!

—*Joaquin Miller.*

Aluminum Lightning Arresters on the San Francisco System

By THOS. E. FOGALSANG, Electrical Superintendent, Station A, San Francisco.

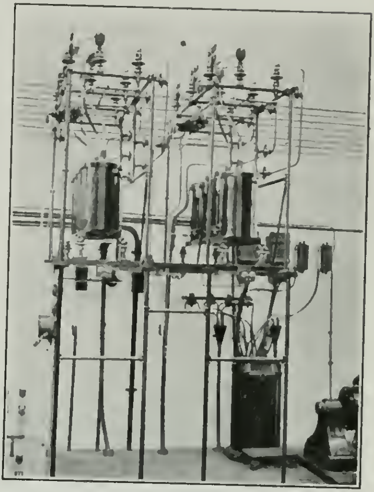
T. E. Fogalsang

A little bit of engineering, that on the face of it looks quite simple, and yet amounts to a great deal from the standpoint of dollars and cents, has just taken place on the San Francisco system, where the Department of Operation and Maintenance of Steam Plants, has installed various sets of Aluminum Cell Lightning Arresters of the General Electric Type.

While this department had nothing to do with the get up or manufacture of these arresters, the fact that they adopted them for the purpose for which they are now used, shows that they are progressive, and ready to take advantage of any new apparatus that the manufacturers can demonstrate will do the work claimed, without jeopardizing the efficiency and continuity of the service.

This department knew of the failings of all previous lightning arrester installations on the Pacific Coast, and it was only after studious observations and careful experiments, that the aluminum cell type was finally selected as the one best adapted to meet the requirements of the local system.

The installation of lightning arresters heretofore, has nearly always been attended with results other than those calculated on. Practical operations demonstrated that the arresters worked, but with disastrous results to the arresters themselves. It did not take lightning to do it either. The surge caused by the opening or closing of a high tension line, has caused many a bank of very elegant looking arresters to make an even grander pyro-technical display than a set piece of General George Washington on a Fourth of July night.



Lightning Arresters

An arrester, to be ideal, must not only be one that will consistently pass any stroke of lightning that may hit the lines, but must also take care of any unusual voltage conditions that may arise throughout the system, and endanger the insulation of line, cable, or apparatus.

When it is known that every time a high tension line or cable is opened or closed from a live end, that undue voltage stresses occur that can puncture an insulator or a cable, or break down a piece of well insulated apparatus, then you have an idea of the value of an arrester that will perform its proper duties. And what occurs on an overhead line is even more disastrous when performed on a mixed system of overhead, and under-ground cable work. Even farther than this, operating a three-phase ungrounded neutral system, as they do in San Francisco, gives a greater leeway for damage to be done, when unusual conditions arise. On a three-phase grounded neutral system, there is a natural strain to ground, equal to the voltage between any two legs, divided by the square root of three; while in a three-phase ungrounded neutral system there is an unnatural stress of equal voltage, due to capacity or condenser effect between legs and the earth. In the case of a grounded system; take a cable for instance, and this cable protected by an automatic circuit breaker or oil switch, one leg becomes grounded, and the result is a dead short circuit that cuts out the cable. But in an ungrounded neutral system, the result is far different. A ground occurs on one leg, with the result that the stress between that leg and the earth is reduced to nil. On the other two legs that are left ungrounded, the stress becomes nearly double, and an almost double strain is put upon the insulation of those two legs. Presume a condition where the voltage between legs is 11,000, but some of the apparatus on the system insulated between line and ground for 6,600 volts, with the idea that it was to be operated on a grounded system where the voltage to neutral was to be 6,600. On an ungrounded system, a ground now comes on one leg. What is the result? Simply this, that the apparatus that was insulated for 6,600 volts now has to stand 11,000 volts on two legs, or the full voltage of the line, and cannot do it, so breaks down. This is where the aluminum cell arrester proves its value, and performs its most effective work. The gaps between the horns being set for a certain critical voltage, anything in excess of which starts the arrester to work, and as long as the voltage stress remains above normal, the arrester continues to discharge. In other words, it works much the same as the safety valve on a boiler. Set to blow off at a certain number of pounds pressure, so long as the pressure does not rise above that point, no steam is let loose, but above that critical pressure it works, and when the pressure is normal again, ceases to blow. It is this important feature of this arrester that does the protecting to weak places in the cables or apparatus, during the time of double stress on the ungrounded legs. As long as the ground remains, two of the legs will continue to discharge and hold down the voltage stress, which, if followed to rise a little higher, might cause several break downs simultaneously, on different parts of the system. This has happened many times before the arresters were installed, but none since.

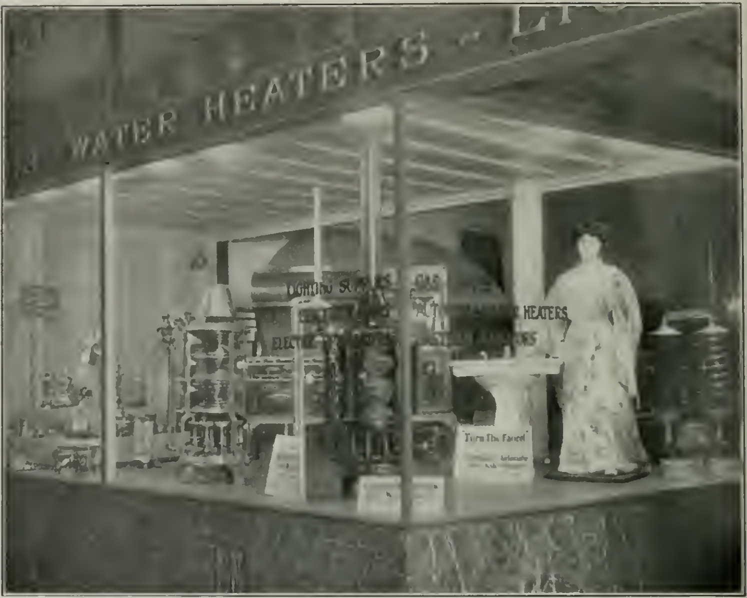
The arresters not only perform these functions very satisfactorily, but also give warning that some unusual things are taking place. For instance, when the ground comes on, the arresters start to "spit" and discharge immediately. This noise gives warning to the operator that trouble of some kind is on, and he can take steps at once to locate the fault, and remove it before serious damage is done, or the service interrupted.

The arresters as made up, are very simple. There is a tank for each phase leg on a three-phase system, where run with a grounded neutral. On an ungrounded neutral system, a fourth or ground tank is used. The reason for this, as previously explained, lies in the difference between the voltage from any leg to the ground, on a grounded neutral system, and the voltage between any leg and the ground, on an ungrounded neutral system, when a ground comes on one leg. In other words, during a discharge on one leg of an arrester connected to an ungrounded neutral system, there are two of the tanks in series. Inside of each of these tanks are the piles of aluminum cones or plates, each one shaped somewhat like a coolie's hat. The cones are spaced equally, and insulated from each other on wooden rods with fiber distance pieces. It is in these cup like spaces between cones, that the electrolyte or fluid is held. When a current is passed through this electrolyte, a deposit of oxide of aluminum is formed on the surface of each plate. This causes the surface so coated, to offer a higher resistance to the passage of the current, which is the secret of the success of this type of arrester. Around the cones, inside the tank, so as to keep down any arc that might form, Transil Oil is used. The electrolyte, being heavier than the oil, is not disturbed in its place. The arresters have to be charged each day, which is done by closing the horns at the gaps and allowing the voltage of the line to do its work through a suitable resistance. The result of this charging is that the oxide of aluminum is formed on the plates, which is very essential to the successful operation of these arresters.

To those further interested in the principles and construction of this type of lightning arrester, as well as a full treatise on the subject in general, we draw attention to The General Electric Company's instruction book No. 8441, on Alternating Current Lightning Arresters.

* * *

The new bungalow, just completed by Mr. C. W. McKillip, Manager of the Sacramento District, in Sacramento. Mr. and Mrs. McKillip are extended best wishes for years of happiness in their new home.



The Story of "Bella Donna" or the Beautiful Electric Lady

BUSY shoppers passing the Gas and Electric Appliance Company are almost invariably seen to stop with a look of amazement on their faces, as they see, for the first time, a handsome woman in a rather daring and somewhat negligee silk kimona, enveloped partially in clouds of steam coming from the basin on her right, where she is negligently turning on and off the hot water. In the meantime she gazes intently in all directions and rolls her lovely brown eyes at you personally while beckoning with her other hand, in the most alluring fashion. Her breathing the while is regular and deep. The look of amazement always turns to a smile when it is finally discovered that the beautiful "Belladonna" is really only a wax figure operated by ingenious electric mechanism. By turning the faucet with her well-shaped wax hand the gas water-heater in the foreground is automatically ignited and furnishes a great stream of steaming hot water.

This mechanical novelty can be adapted to other forms of window demonstrating such as operating a gas range or ironing with the electric iron, exciting much more interest and comment than does the ordinary human demonstrator.

Prof. Otto Goetze of Berlin manufactured the figure in San Francisco, after designs furnished by Sam P. Hamilton of the Gas and Electric Appliance Company.

The Municipal Electric Light Plant

From the Roseville Register, Sept. 15, 1911.

At the next meeting of the city trustees the question of purchasing a municipal electric light plan will probably come up for consideration. The proposition was thoroughly discussed a year and a half ago and the question of issuing $10,000 worth of bonds for the purchase of a municipal plant was voted on about sixteen months ago and carried by a vote of 227 to 83, almost three to one. At that time the Register was an earnest and honest advocate of this proposition because we believed that the city could give a better and more economical service than we were getting at that time and the general public would be better satisfied. Personally, the editor of this paper has never had any cause for complaint over the power or light service, either from E. D. N. Lehe or his successors, the Pacific Gas & Electric Company, who now conduct Roseville's electric light and power system.

Since the Pacific Gas & Electric Company bought Mr. Lehe out, shortly after the bond election last year, many expensive and necessary improvements have been made in the system here and the service is just as good as can be found in any town of similar size in the State. We do not believe the present system could be purchased for $10,000, if indeed it could be purchased at all. Nor do we believe that the city could install as efficient a service as we now enjoy for the $10,000 bonds they have for the purpose. Again, we doubt very much whether the city could make a municipal light plant pay with a competing company in the field. There is no question but what a municipal plant would be a good paying proposition, and a better rate given to consumers, if all the business could be controlled. Here is the main problem.

In our opinion this matter should be thoroughly canvassed by the trustees before taking any further steps in the matter. Every consumer of electricity should be interviewed personally and should sign an agreement to patronize the municipal plant before any efforts are made to establish the same. There is not enough business to support two plants, and unless the municipal plant can get the business it would be a waste of money to oppose the present system. In case the consumers should agree to patronize the city plant it would then be an easy matter to buy the present system, or if the price demanded prove unreasonable install a system of our own. It is not likely that the Pacific Gas & Electric Company would care to operate a plant here without customers and it would pay them better to sell their plant to the city rather than remove it or close it down. And then the city might still continue to buy power from them to operate the plant.

The Register is not "crawfishing" in this matter at all, but is taking a common sense view of a simple business proposition. Even if the people did vote for a municipal plant they are not going to be fools enough to demand that their wishes be carried out when it is shown to be a losing proposition. This matter demands deep consideration.

A recent bulletin received from the General Electric Company, reports the construction of a new pneumatically operated disconnecting switch, made in voltages from 35,000 to 110,000, and for currents of from 100 to 300 amperes.

The H. W. Johns-Manville Company are erecting a new twelve-story exclusive office building for their New York headquarters in Forty-first Street and Madison Avenue, New York City. The building has been specially designed to care for the wants of this large and growing concern.

Nobody steps on a Live Wire—only the dead ones are used for door mats.

The Nineteenth Convention of the Pacific Coast Gas Association

Oakland, California, September 19th, 20th and 21st

By HENRY BOSTWICK.

THE Nineteenth Annual Convention of the Pacific Coast Gas Association, which convened in Oakland, California, at 10:30 A. M., September 19th, with President Frank A. Leach, Jr., in the Chair, developed into the most successful meeting held by the Association—not only in point of papers which were read before the meetings, but also in point of attendance, and the exceptionally keen interest taken in the meetings by the members present.

President William Baurhyte and Past Persident Frank A. Leach, Jr.

One hundred and forty-one active, and 43 associate members answered the roll call; this being the largest attendance at any of the Conventions in the history of the Association. Forty-five new members were elected.

The first session of the Convention was consumed with the reading of special report, and the transaction of miscellaneous business.

Communications were read from the Secretary of the Chamber of Commerce, the Mayor of San Diego, and the San Diego Consolidated Gas and Electric Company, inviting the Association to hold its 20th Convention in that city, in September, 1912, and as this matter had previously been taken up before the Directors' meeting, and favorably recommended by them, San Diego was accordingly named as the Convention City for 1912.

For some years past the Association has maintained a Committee on Gas Engineer's Degree, with Mr. John A. Britton as Chairman; this for the purpose of ultimately having such a degree incorporated in the curriculum of the University of California. After this Committee had made a verbal report before the Convention, which was to the effect that the matter had been taken up by them with Professor Cory of the University, and by him with President Benjamin Ide Wheeler, and had met with favorable consideration at

L. P. Lowe "trying to show" John A. Britton

the hands of the President, it appeared as though the psychological moment had arrived, and $2,000 was thereupon raised by popular subscription by the members present.

Steps will immediately be taken to provide for the establishment of a Chair in the University of California of a "Gas Engineering Degree," which will be maintained for a period of five years by the Pacific Coast Gas Association.

The Secretary will, in due course, notify all members of the Association, fully covering this matter and the object to be attained.

Later in the day, President Wheeler appeared before the members of the Association. In a stirring address, exploiting fully the present-day University education as compared with that in the past, he took occasion to say that, while a University can confer all manner of degrees upon its students, and send him forth from the college with all the knowledge that any being could possibly absorb, unless that same party was possessed with a sufficient amount of "gumption," which would enable him to put into effect and force such knowledge as he had been trained in during his University course, it would be of no value to the student.

After President Wheeler had finished his remarks, he was honored by being elected an Honorary Member of the Association.

During the first morning's session, Mr. C. W. Quilty, a Charter Member, and also its Third President, and Mr. T. R. Parker, a Charter Member and its Fifth President, were also honored by being unanimously elected to Honorary Membership in the Association.

The matter of a Joint Gas Congress to be held in San Francisco in 1915 was taken up, and after a great deal of discussion, a new committee, of five, was appointed. This committee will take up this matter actively during the coming year.

The amended suggestions covering the new Constitution and By-Laws, copy of which was recently forwarded to all members, were unanimously adopted after a few minor changes were made. Corrected copy of same

C. S. Vance and T. R. Parker, two royal entertainers will be sent to all members of the Association for their information.

The following papers were read before the Convention, and all of them brought out very interesting discussions:

John Werry and John D. Kuster—a couple of left-handed Elks

President's Address	Frank A. Leach, Jr.
Unstable Hydrocarbons in Illuminating Gas	E. C. Jones
Suburban Gas Distribution	C. S. S. Forney
Rate Fixing	C. L. Cory
The Napthalene Problem in Oil Gas Manufacture and Distribution	F. S. Wade
Early Gas Lighting	W. R. Morgan
Mechanical Handling of Carbon By-Products of the Oil Gas Process	D. J. Young
The Gas Meter	W. M. DuVal
Our Investigation Department	C. M. Hunt
Wrinkles	F. C. Millard
Experiences	John D. Kuster
Novelties	John Clements

The paper presented by Professor C. L. Cory, "Rate Fixing," was one of more than ordinary interest, and in view of this fact it was also ordered that the same be printed in pamphlet form and sent to all members for their general information.

The suggestions of Professor Cory in this paper as to the proper method of keeping records of the actual investments represented by gas and electric plants will be found to be of very great value, and should be given heed by all engaged in the business, and if carried out along the lines suggested cannot help but have a tendency to minimize the difficulties experienced with city trustees and other governing bodies when the matter of rate fixing is taken up by them. With his suggestions carried out, the company's records will then show the actual amount of the investment, and with this information to hand, the legislative bodies who may have the power to fix rates will then be in a position to arrive at what might be termed equitable rates based upon such actual investments, instead of fixing rates based upon some hypothetical investment, as has been done in a great many instances in the past.

The following were named by the Nominating Committee as officers for the fiscal year 1911-12, and were duly elected:

President—William Baurhyte, Los Angeles, Cal.
Vice-President—Henry E. Adams, Stockton, Cal.
Secretary—John A. Britton, San Francisco, Cal.
Asst. Secy.—Henry Bostwick, San Francisco, Cal.
Board of Directors—
J. C. Keyes, Sacramento, Cal.
C. S. Vance, Los Angeles, Cal.
C. F. Stamps, Jr., Los Angeles, Cal.
H. H. Jones, San Diego, Cal.
Geo. C. Holberton, San Francisco, Cal.
R. J. Thompson, San Francisco, Cal.
S. Waldo Coleman, Santa Cruz, Cal.

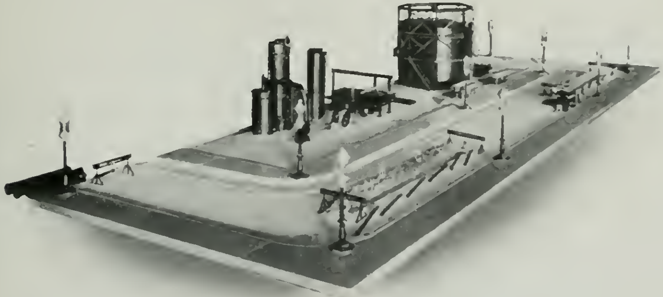
The banquet, which was held at the Key Route Inn on Wednesday evening, September 20th, was, as in the past, a huge success, and as a little diversion there was a comedy enacted which represented the fixing of the gas rates by the City Trustees of the Town of Skeedunk; the cast being represented by:

Mayor	R. L. Van der Naillen
Clerk	Van E. Britton
City Attorney	W. H. Kline
City Marshal	D. A. White
Councilman	R. J. Cantrell
Councilman	C. F. Stamps
Councilman	Sherwood Grover
Councilman	S. V. Walton
Expert for City	Wallace H. Foster

On this same evening the ladies of the Association were tendered a theatre party as guests of the Pacific Gas and Electric Company.

As guests of the Pacific Gas and Electric Company, the members and their families enjoyed an outing on Thursday, which consisted of a trolley trip through Alameda County, and the party, through the courtesy of the Standard Oil Company, was accorded the privilege of visiting its refineries at Richmond. Luncheon was served to the party at Piedmont Park. There were two hundred on the outing.

Unique Table Decoration



Austin J. Rix

Among the interesting features that made the nineteenth annual convention of the Pacific Coast Gas Association a marked success was the unique table decoration devised and carried out by Mr. Austin J. Rix, of the Engineering Department, and displayed at the President's table at the banquet held in the Key Route Inn, the night of Wednesday, September 20th.

The illustration speaks for itself.

The total space occupied by this miniature gas plant on the table was 10 feet by 40 feet. The gas holder is 13 inches in diameter by 14 inches high, and modeled after a 175,000 cubic foot gas holder. The gas machine is in duplication of a 6 foot 6 inch Jones set, capacity 20,000 cubic feet per hour, and occupied a space of 12 by 24 inches.

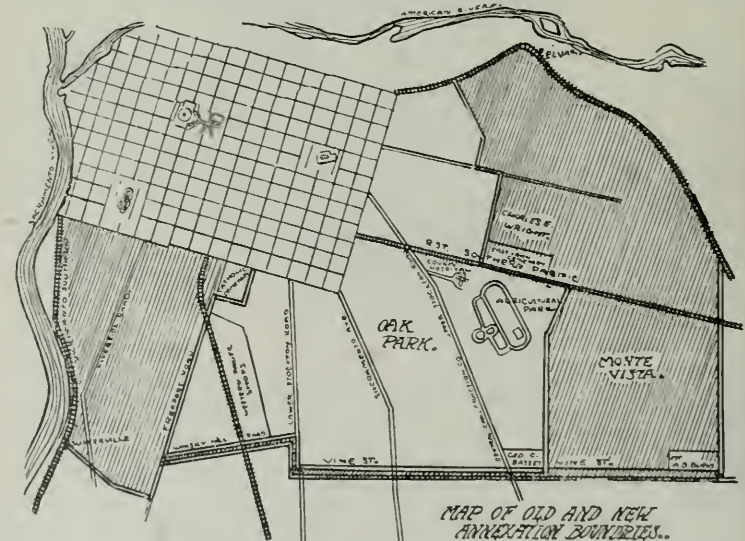
Primary	generator	is 2¼ in. diam.,	5½ in. high
Secondary	generator	is 2¼ in. diam.,	11½ in. high
Scrubber		is 2¼ in. diam.,	9¼ in. high

Two iron purifiers 3½ in. square.
(Scale ⅜ in.=1 foot.)

Greater Sacramento

By S. GLENN ANDRUS, Secretary-Manager, Chamber of Commerce, Sacramento.

SACRAMENTO is now a Metropolitan city and a live commercial center of fully 65,000 population. "Greater Sacramento" became a fact on September 12th when the voters of the city and the voters of half a dozen suburbs decided to consolidate under one city government. The annexed territory together with the former city of Sacramento constitutes an area about five miles square and gives Sacramento sufficient room in which to expand and grow for the next ten years, at least. In one respect the annexation differed from annexation movements in most cities as there was no physical demarkation of the limits of the former city and the various suburbs which were annexed. A stranger would not know, for example, when he had left the old city limits and entered the limits of the former suburb, Oak Park. It is estimated that between 15,000 and 18,000 people reside in the suburbs which were annexed. The official United States census of a year ago gives the Sacramento of that time a population of 44,696. Since May 1910, however, the date when the Government census was completed, both Sacramento and the



The cut above shows the boundary lines of the newly annexed territory. The checker-board portion shows the City of Sacramento proper. The white portion is territory it was proposed to annex at the election held last year. The question of taking in the territory which shows white was defeated in 1910 by a vote of 1401 for and 403 against in the city, and 397 for and 459 against in the suburbs.

The shaded portion of the map is the additional territory included in the issue which was successful by a vote of 1390 for and 630 against in the city, and 808 for and 355 against in the suburbs.

suburbs have grown at a marvelous rate. During the past year, as shown by the County Registrar's records, 1,200 new voters have been added to Sacramento City. Using the ratio of 4½ to one this would make 5,400 new residents in former Sacramento proper since the taking of the census. This would bring the population of the former city of Sacramento up to fully 50,000. Add to this the low estimate of 15,000 for the suburbs and we find that Sacramento is a city of fully 65,000 people. Annexation, which was originated and successfully promoted by the Chamber of Commerce brings the assessed valuation of city property up to approximately $45,000,000, and makes possible a development which could not have been undertaken under the old order. Owing to Annexation, the people of "Greater Sacramento" are already exhibiting a new brand of civic pride and a determination to make the Capitol City of the best State in the Union such that its fame will spread throughout this and other nations.

Suburbs annexed were:—Oak Park, East Sacramento, Highland Park, Curtis Oaks, Oak Grove and Riverside. See map on page 174.

* * *

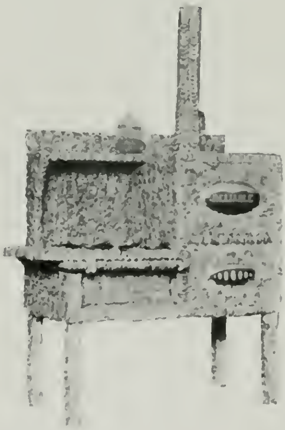
The Apple Show at Sebastopol

By H. J. WATERS, Santa Rosa District.

L. E. Daniels

The Annual Gravenstein Apple Show at Sebastopol, held during the week of August 21st, afforded an excellent opportunity for the display of gas appliances, which was taken advantage of by Mr. M. G. Hall of the Santa Rosa District, with the result that a very commendable display was made, and which redounded to the credit of the district and to the employees that participated therein.

One of the young boys in the local office, Mr. LeRoy E. Daniels, was delegated to display his talent in window decorating, and how well he succeeded can best be illustrated by the accompanying cut of the large gas range, which he so opportunely decorated with sliced dried apples, and which decoration took a prize and attracted a great deal of attention. Daniels is only 14 years of age, and deserves a great deal of credit for the general mechanical ability which he possesses, and the novel idea which he carried out in this particular instance.



In addition to the show window exhibit, space in a large tent was secured, in which a cooking demonstration was carried on during the week. Three large gas ranges were installed, and about 1,500 applies pies were turned out. The fact that none of these apple pies is known to have escaped from the district is proof positive of their excellence.

A very pretty decorative scheme was also carried out in this tent, displaying the Company's trade-mark on a large scale. The sides of the triangle were ten feet long, studded with 54 incandescent lamps, finished off with three boxes of apples artistically arranged.

About 145 kilowatts of electricity and over 10,000 feet of gas were consumed in this tent during the week.

* * *

The Passing of a Pioneer

THERE died in San Francisco on August 17th, 1911, Mr. Bartholomew Murphy, who was not only a California pioneer in the true sense of the word, but was also a pioneer in work of the great water development of the State of California.

He was born in Illinois, April 4th, 1852, and came to California when a child. He was first employed by the old South Yuba Water Company in Nevada County, January 1st, 1877, and was initially stationed on the middle section of the Main Ditch near what is known as "Haven Camp." He filled the position of ditch tender and patrolman in this section for nine years, and was also stationed at the head of the Boardman Ditch for two years. He was then transferred to what is known as the "Big Tunnel" where he served for nineteen years, and was then transferred to Bear Valley where he spent the last four years and remained up to the time of his last illness.

Bartholomew Murphy

In all the years of employment he was located in what is known as the "snow belt" where the winters are long and severe, and the penalty for negligence during the winter storms would mean the loss of miles of ditch, and the expenditure of thousands of dollars in replacements.

It is paying him only a just tribute for loyalty and efficiency to mention his long years of service as testimony of the faithfulness with which he fulfilled the duties assigned to him.

The surviving family consists of a widow and son, Mr. James Murphy, who is employed by the Pacific Gas and Electric Company in the Civil Engineering Department.

A Satisfactory Settlement

A recent communication received from Mr. W. E. Osborn, Manager Woodland District, chronicles the fact that a very amicable adjudication has been arrived at between the City of Woodland and the Pacific Gas and Electric Company, whereby the City of Woodland has secured an excellently pure and adequate water supply. This also ends an old controversy handed down from the year 1906, between the old Woodland Gas and Electric Company and the municipality, and both the City of Woodland and the Pacific Gas and Electric Company are receiving congratulations on the pleasant termination of this old difficulty.

The gas works in the City of Woodland is located on property adjoining that occupied by the City water works, and upon which property a number of wells have been sunk from time to time, for the purpose of securing the city water supply.

In 1906 notice was served upon the local gas and electric company, that, according to the city engineer, the municipal wells were being contaminated by seepage into them of a small percentage of coal tar, presumably coming from the gas works adjoining. While the engineers of the gas company have always contended that this report was not verified by the prevailing conditions, the gas and electric company, however, conceded the point, and took steps to sink a well farther away from the gas works to replace the well which, it was claimed, had been polluted. This well, however, was not satisfactory, as the casing and curbing which was installed entirely eliminated all surface water, and the well did not produce the necessary flow. A second well was drilled with the same result.

The Pacific Gas and Electric Company, although it fell heir to this old burden, felt morally obligated to the City of Woodland to carry this matter to a satisfactory end, and in May, 1911, instructed its Engineering Department to sink a third well in the west end of the City of Woodland, in what is known as "Fisher's Addition," and on property belonging to the municipality.

This well has a 12-inch bore, has been highly successful, and a 4-inch stream of pure, clear water is now being pumped into the city mains for general distribution. The fire plugs in different parts of the city have been tried out since the installation of this new supply, and have shown an adequate force and supply for fire protection.

An electric-driven pump has been installed adjacent to this new well, and on August 29th, Trustee Mitchell, ex-mayor of the City of Woodland, threw the switch and officially started the pump, which will give to Woodland this new and excellent water supply.

The officials and engineers of the Pacific Gas and Electric Company are highly gratified at this satisfactory outcome of their last efforts to please the officials and general public of the City of Woodland. R. J. C.

Calcutta Public Lighting Burner

Report on the Mansfield Inverted Burner

By W. B. MacCABE, Chief Engineer of Corporation of Calcutta.

London Journal Gas Lighting, Nov. 29, 1910.

This new inverted burner, which was that selected for the public lighting of Calcutta, consumes 2 cubic feet of gas per hour and gives 50 candles at an angle of 50° downwards, 40 candles at an angle of 20° downwards, and a mean illumination of 45 candles. The burner is the simplest one yet seen by the writer, and it is impossible to make it light back. With a reduction in pressure to below two inches, there is but little falling off in the illuminating power; but raising the pressure from two to three inches gives a very great increase in illuminating power.

Another feature is that the same burner can be used with different quantities of gas by only altering the nipple and the nozzle, making it capable of wide application.

What the Press Has to Say

Free "Juice" For Festival

Manager Don C. Ray of the Pacific Gas and Electric Company, who has Walnut Creek in his district, announced Friday afternoon that the company would furnish the electric current for the carnival without charge. Linemen will be put to work at once installing additional and larger transformers to carry the increased load which will enter the town over the lines of the company. This action on the part of the company is appreciated by the management of the carnival, and the boosting spirit of the company has won the favor of the people of Walnut Creek.

Martinez (Cal.) *Gazette*, Sept. 22, 1911.

Build Branch Line

WHEATLAND (Yuba County), Sept. 12.—To furnish power for pumping water for irrigation, the Pacific Gas and Electric Company has a force of men constructing a branch line from Wheatland to the Huntington tract on the Bear River, four miles from this city.

Experiments have been made by several land owners in this vicinity on irrigation by pumping plants from wells. The wells bored, without exception, furnish an abundance of water. There will be many acres planted to alfalfa next season that will be irrigated from these wells.

Sacramento (Cal.) *Union*, Sept. 13, 1911.

Will Improve Service

Pacific Gas and Electric to Rebuild Substation at Davis

The Pacific Gas and Electric Company, we understand, is contemplating a large amount of improvement work for Davis. It is understood that the substation will be completely overhauled and renovated, and the equipment that will be introduced therein will be of a much more extensive nature than the present. Also, it is proposed to completely re-wire the town of Davis, and when all is completed the service to be given will be of the three-phase proposition instead of one-phase, and it is understood that Davis will have a very thoroughly up-to-date and efficient service in operation when present plans have been carried into execution. It can readily be imagined that the service might be wonderfully improved. We are assured that new street lights will be installed that will be more efficient by several hundred per cent than the present ones, and with perhaps a less insatiable appetite for juice.

Davis Enterprise, Sept. 9, 1911.

Service for Suburbs Given

Gas Company Extends Mains to Eastern Outskirts and is to Build Further

Extensions of the Pacific Gas and Electric Company's mains to all of the suburbs of the city are being planned, and requests were filed with the City Commission this morning for the opening of streets on the eastern outskirts of the city to supply new service. The streets to be opened up are Maine and York between Railroad and Contra Costa Streets, and Contra Costa and Amador between Georgia and Maine Streets. Two-inch mains are to be laid. Superintendent Stevens announces that pipes will be laid to Cypress Knoll and other suburbs as soon as they are built up.

Vallejo News, Sept. 19, 1911.

New Lighting Company that was to Operate in San Jose Has Now Abandoned the Project

The Great Western Power Company, that has been securing contracts in San Jose for lighting, with the expressed determination of establishing a plant here, has announced that the project has been abandoned. The reason given is that the right of way for the power wires could not be secured; that as soon as this is done that the company will operate in this city.

One reason is as good as another, but the majority of people will take the excuse with a grain of salt, maintaining that the reason given out is not of sufficient importance to stop the project.

If the agents of the company return here later and try to get lighting contracts they will find a lot of people who will want some further guarantee that the company intends to "come through," than an application blank or contract.

San Jose (Cal.) *News*, Sept. 7, 1911.

Cannot Compel Removal of Line

Supreme Court Reverses Decision in Case Against Power Company

RED BLUFF (Tehama Co.), Sept. 9.—County Clerk Kuhn has received notice that the Supreme Court has reversed the decision of the Superior Court of Tehama County in the case of W. H. Gurnsey against the Northern California Power Company. The Supreme Court holds that Gurnsey cannot make the power company remove its poles, but that he has ground for action to recover damages.

Gurnsey owns a large ranch in this county, over which he has allowed the public the use of highway for forty years. The Board of Supervisors granted the power company a franchise over the roads of Tehama County. Believing the road through the ranch to be a public highway, the company built its power line along it.

Gurnsey brought action to eject the company from his property, and the Superior Court rendered judgment ordering the company to remove its pole line. The power company appealed from the decision. The Supreme Court decided that it was not necessary for the company to remove its poles, as it could condemn a right of way over the land of any individual. It admits that while the public had an easement on the road on account of long use, all other rights of soil belong to Gurnsey, and the Northern California Power Company infringed on these rights when it constructed the power line over the land of Gurnsey without his permission.

Sacramento Union, Sept. 10, 1911.

"Dad"

Some boys call their Dad "Papa;"
Oh, Gee! that makes me mad,
It sounds so stiff and like a book—
You bet, I call mine Dad.

And he's a ripper, too, you bet,
The boys all wish they had
A father that would laugh and joke,
And love them like my Dad.

Of course, sometimes, when all the bills
Come in, he's mighty mad;
And then we sit as still as mice
And hear him jaw—poor Dad.

It's always over soon, and then
You bet we all feel glad;
And then we all climb on his lap
And hug and kiss our Dad.

"You can't have kids and money too,"
He says, and so he's glad
The good Lord made him poor, or else
He mightn't been our Dad.

And I don't want to be President,
Like every little tad!
When I'm grown up, I'd rather be
A nice man, just like Dad.

—*Lippincott's.*

It is by teaching that we teach ourselves, by relating that we observe, by affirming that we examine, by showing that we look, by writing that we think, by pumping that we draw water into the well.

Amiel.

Pacific Gas and Electric Magazine

PUBLISHED IN THE INTEREST OF ALL THE EMPLOYEES OF THE PACIFIC GAS AND ELECTRIC COMPANY

JOHN A. BRITTON - - - - - - - Editor
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The Pacific Gas and Electric Company desires to serve its patrons in the best possible manner. Any consumer not satisfied with his service will confer a favor upon the management by taking the matter up with the district office.

Vol. III OCTOBER, 1911 No. 5

EDITORIAL

THE ACTION TAKEN AT THE 19TH annual convention of the Pacific Coast Gas Association, in raising a fund to create the degree of Gas Engineering, to be conferred by the University of California, and the promised aid of that institution of learning, conveyed by President Benjamin Ide Wheeler in his masterly address to the members, marks an epoch in the Gas History of California.

Uniquely situated as our State is, with respect to other parts of the Union, it has had to carve its own way; precedent has been of little value to the body of men who in California, have made and are now making history for the Gas world.

The pioneers in the gas industry were practical men, of mechanical minds, and the growth of the State matured them in the art and science of gas construction, manufacture, and distribution; and taught them to devise ways and means to overcome old conditions, and to meet new ones.

Oil Gas manufacture and high pressure gas distribution both had their origin, and their completion here.

The profession of Gas Engineering has been neglected not only on this coast, but elsewhere in the United States, largely because it has not received from seats of learning a stamp of approval.

Mechanical, civil, mining, hydraulic, electrical, irrigation, sanitary and other branches of engineering, have received recognition by degrees conferred, but this part of engineering, as old as any of the others, has been overlooked, and therefore no incentive given to the student body of a University to seek out a course in this profession.

The practical gas engineers all over the country are perhaps somewhat responsible for this condition of affairs—they have had their light under a bushel. They have not either through selfishness or neglect attempted to make their profession one to be sought after, and as a consequence the ranks of active gas engineers is being depleted, and if salvation was not imminent, the profession would soon be numbered among the lost arts.

The University of California will now afford opportunities, to graduate men, who will be possessed of the fundamentals of the profession at least, and positions of responsibility among Gas Companies in all its departments, will be afforded to the graduate student, and not only will this apply to what heretofore has been considered the purely technical end, viz:—manufacture, but will further extend to construction in all its phases, as applied to the art, and as well to distribution, and the exercise of a thorough training in the art of proper illumination, and the utilization of the by-products, now neglected.

It is incumbent upon the Pacific Coast Gas Association to do more than the mere contributing of money. It is its duty to see that the University is provided with men eminent in the profession, who will become lecturers in the art, and impart the knowledge begotten from years of experience, and not from mere "book learning," to the classes to be formed in this new addition to the college curriculum. Much of the history of Pacific Coast conditions has not been written, and like the ritual of fraternal orders, has been handed down from one generation to another by word of mouth, but now is the golden opportunity to have it handed down to that oncoming body of graduate engineers, who will place the Gas Engineer on a parity, by the stamp of a College Degree, with all of the other honorable engineering profession; recognized by the world of science. Again is gas coming into its own.

The Pacific Gas and Electric Company has on all occasions in the past, where its officers have been called upon to make public addresses, through its advertisements, and in the columns of the Company's magazine, only asked justice and fair treatment at the hands of the public and the press, and the right to present our side of the case where business controversies have arisen, and be accorded a chance to justify positions we have assumed and considered our right to assume, under the conditions obtaining.

We have at all times asked that we be looked upon as a mercantile institution, manufacturing certain commodities and disposing of those commodities to the public as demands are made upon us.

We are quoting herein an editorial from the *Sonoma County Independent*, Petaluma, September 8th, 1911, issue, which follows out this big idea:

In view of the allegations, and with knowledge of the facts in dispute between the Pacific Gas and Electric Company and the Corliss Gas Engine Company, we are of the opinion that the civil action for damages to be heard before Judge Seawell next Monday, is an error in legal proceedure.

We aver that if the reports be true, not a civil but a criminal court should adjudicate between the parties, and that the right place for the defendants is in the dock and not the witness stand.

It is almost beyond belief that the attempt alleged to have been made by employees of the defendant company to destroy property of the complainants is escaping criminal action.

The facts, as sworn to by responsible people, are that a dispute about a solitary power pole, which the Corliss Gas Engine Company had requested the complainants to remove from their premises, and which the complainants refused to do, culminated in employees of the Corliss Company throwing a wire over the high potential line connected with the pole in dispute, which resulted in fuses being blown out and the suspension of power and light in this city, at San Rafael, Ross, Sausalito, Mill Valley, San Quentin, and other places, the stoppage of electric cars and the closing of factories.

The material damage done is not, in our opinion of more than passing moment, but the possibilities for a great tragedy which the action of these men opened up, is appalling and should receive more than passing condemnation.

The life of every man, woman, and child in this community was endangered, and the laws under which we are guaranteed life, liberty, and protection should demand that action be taken to obtain security against further outrage and punishment for the guilty parties.

The Corliss Gas Engine Company had a remedy at law if they felt an injustice was being done them, but the attempted forcible removal of the objectionable pole was not only illegal but it directly endangered the lives of the artisans and laborers who were pursuing their work in the vicinity of any machinery of which the motive power was electricity. R. J. C.

Advice to Utility Company Employees

As a reminder of its employees' duties to those outside the organization, the North Shore Electric Co., of Chicago, has caused the following notice, signed by Vice-President Frank J. Baker, to be posted in its offices:

To Employees:

Don't forget that you are in the service of the public.

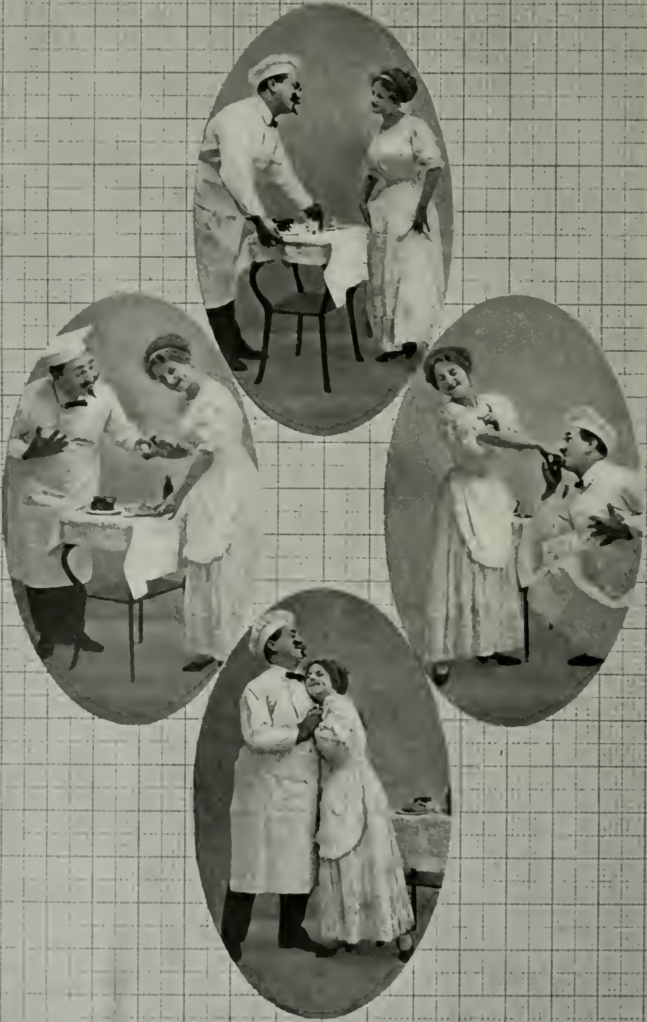
Treat customers politely and courteously.

Do n't misrepresent anything.

Do n't think that you are doing the company a favor by beating a customer on a deal.

The motto of the company is, "A Square Deal to the Public." See that you help us live up to it.

Public Service, Sept., 1911.



COOKING LESSONS

Domestic Science Lessons

By MRS. H. ROSE STEWART.

LESSON III.

"We may live without poetry, music and art,
We may live without friends,
We may live without heart,
We may live without hope,
We may live without books,
But civilized man cannot live without cooks.

We may live without hope,
What is hope but deceiving?
We may live without books,
What is knowledge but grieving?
We may live without love,
What is passion but pining?
But where is the man that can live without dining?"

SERVING AND COOKING FISH

HOW TO SERVE OYSTERS FOR PRIVATE FAMILIES

Oysters should be kept in a very cold place before they are opened, and well washed before using, other wise their appearance will be destroyed. They should, according to the French custom, be opened on the deep shell, so as to better preserve the liquor, then laid on finely chopped ice for a short time—too long destroys their flavor. While they should be kept as cold as possible, they should never be allowed to freeze, therefore they must only be opened shortly before they are needed; for once frozen, they quickly turn sour. The proper way to open them is to place the deep shell in the palm of the left hand, and break them on one side. The Boston stabbing knife is preferable for this, but if there be none handy use a small block that the oyster can fit into, and stab it on the edge; or even a chopping-block and chopping-knife may be employed in case of necessity. Serve six oysters for each person, nicely arranged on oyster-plates with quarters of lemon.

FRIED WHITE-BAIT

Have one pound of fine fresh white-bait, thoroughly wash them in cold water; the water in which they are washed must be very cold, a piece of ice can even be added to it, so as to keep them firm, thoroughly drain, then inclose them in a dry towel and lightly shake them so as to thoroughly dry. Dip them in cold milk. Mix together two cups of cracker-dust with one cupful of flour, roll the white-bait into this, and then fry them in a very hot fat for one minute only. Remove, and thoroughly drain, sprinkle over a tablespoonful of salt equally divided. Dress on a hot dish with a folded napkin, and immediately send to the table.

White-bait should never be prepared in advance, except one minute before the time of serving, as they are very easily spoiled.

SALMON, OYSTER SAUCE

Place two pounds of very fresh salmon in a fish-kettle, completely cover with cold water, season with a handful of salt, add one medium-sized, sliced onion, half a wine-glassful of white vinegar, eight whole peppers, two cloves, and two parsley-roots. Range the kettle on a brisk fire. Five minutes after coming to a boil the salmon will be sufficiently cooked. Remove from the kettle, drain it well; dress on a hot dish with a folded napkin, nicely decorate with parsley-greens all around the salmon, and serve with a pint of hot oyster sauce.

The necessary time to cook the above to perfection, from beginning to end, will be thirty-five minutes.

BOILED HALIBUT

Put a piece of halibut weighing two pounds in a saucepan, and cover it with fresh water; add one sliced onion, half a sliced carrot, Season with a handful of salt and two tablespoonfuls of vinegar. Put on the lid and let cook gently, but no more than five minutes after boiling-point; then lift up the fish alone, drain well; dress it on a hot dish, and serve with any desired sauce.

BROILED SHAD'S ROE, WITH BACON

Procure six pieces of fresh shad's roe, wipe them thoroughly with a towel, then lay them on a dish, and season with a good pinch of salt and two tablespoonfuls of sweet oil. Roll them gently to avoid breaking, then arrange them on a broiler, and broil them for six minutes on each side. Take them off the fire, lay them on a hot dish, and pour a gill of maitre d'hotel butter over; decorate with six slices of broiled bacon, and six quarters of lemon; then send to the table.

TO PREPARE BREADED FISH

1. After the fish is pared, cleaned and dried, dip it first in milk, then in flour, and fry in very hot fat.

2. Take very clean fish, dip it in beaten egg, then in freshly grated bread-crumbs, and fry in very hot fat.

3. For certain fish, like whitebait, immerse them in milk, then in flour mixed with pulverized crackers, shake well in a colander, and throw into very hot fat. Oysters are breaded the same way, but should be flattened before frying.

4. For croustades of rice or potatoes, dip in beaten egg and roll in fresh bread-crumbs; repeat three times before frying.

BLUEFISH A LA ITALIENNE

Score and scale two pounds of bluefish; place it in a buttered pan, with half a glassful of white wine, three tablespoonfuls of mushroom liquor, half of a very finely chopped onion, and six chopped-up mushrooms. Season with a pinch of salt and half a pinch of pepper. Cover the fish with a buttered paper, and cook in a moderate oven for fifteen minutes; take the fish out, lay it on a serving dish, and put the juice in a stewpan, adding a gill of sauce, with a small glassful of white wine; reduce for two minutes, then pour it over the fish, with one pinch of finely chopped parsley, and serve with six heart-shaped pieces of crouton.

OYSTER PATTIES

Take twenty-four medium-sized oysters (the least salted oysters are better for this purpose), put them in a stewpan with their own liquor, and add half a pinch of pepper. Cover, and let cook for two minutes; then take half the liquor out, and add to the oysters three-quarters of a pint of bechamel sauce, and a very little grated nutmeg; simmer for two minutes, but do not let boil. Take six hot patties, fill them up with four oysters each, pour the sauce over, and place the covers on top. Serve on a dish with a folded napkin.

OYSTERS SCALLOPED A LA BALTIMORE

Have three dozen good-sized, fine, freshly opened box oysters, put them in a bowl. Season with a saltspoonful of cayenne pepper, and entirely suppress their liquor, seeing that they are almost dry. Have six small silver scallop-shells, lightly butter the interior of each, then evenly spread a tablespoonful of fresh bread-crumbs in each shell, gently lay six oysters in each shell over the crumbs, and then sprinkle a tablespoonful of bread-crumbs on the oysters in each shell; place half a teaspoonful of good butter in the centre of each shell; place them in a very hot oven to bake for fully fiftten minutes, or until they have obtained a good golden color. Remove them from the oven. Dress the six shells on a hot serving-dish with a folded napkin, and send to the table.

HARD-SHELLED CRABS A LA DIABLE

Fill six thoroughly cleaned crab-shells with some crab forcemeat, which is made same way as lobster forcemeat, only using twelve crabs instead of lobster, flatten them with the hand, besprinkle with fresh bread-crumbs, smooth the surface with the blade of a knife, moistening the top with a very little clarified butter. Place them on a baking-pan, and bake a little brown for six minutes. Serve on a hot dish with a folded napkin decorated with parsley-greens.

DEVILED CRABS

1 cup crab meat picked from shells of well-boiled crabs
2 tablespoons fine bread crumbs or rolled cracker
Yolks 2 hard-boiled eggs chopped
Juice of a lemon
½ teaspoon mustard
A little cayenne pepper and salt
1 cup good drawn butter.

Mix 1 spoon crumbs with chopped crab meat, yolks, seasoning, drawn butter. Fill scallop shells (large clam shells will do—or small pate-pans) with the mixture; sift crumbs over top, heat to slight browning in quick oven.

TO BOIL LOBSTERS OR CRABS

The lobster is in good season from April to December, and should be purchased alive and plunged into boiling water in which a good proportion of salt has been mixed. Continue to boil according to size about twenty minutes. Crabs should be boiled in the same manner, but a little more than half the time is necessary.

TO OPEN A BOILED LOBSTER

Wipe off shell, break off large claws; separate tail from body; take body from shell, leaving "lady," or stomach, on shell. Put aside green fat and coral; remove small claws; remove woolly gills from body, break latter through middle, and pick out meat from joints. Crush or cut under side of tail, draw meat from shell. Draw back flesh on upper end and pull off intestinal cord. Break edge of large claws and remove meat.

OYSTER CROQUETTES

25 oysters
1 dessertspoon chopped parsley
3 oz. butter
1½ oz. flour
1 gill milk or cream
1 teaspoon lemon juice
1 egg
3 tablespoons bread crumbs
Salt and pepper

Boil the oysters in their own liquor five minutes, cut them in rough pieces; melt the butter in a saucepan; stir in the flour, add cream by degrees, also oyster liquor; boil two minutes; then add the parsley, pepper and salt. Put in the oysters and allow the mixture to cool. Then form it into croquettes on a slightly floured board. Roll in the beaten egg and bread crumbs and fry in hot fat two minutes.

CREAM OF FISH

½ lb. cold fish
1 gill aspic
1½ gills cream
½ pint tomato aspic
½ oz. gelatine
1 lettuce
1 gill mayonnaise
Seasoning
Lemon juice

First set a little tomato aspic in border mould; pound the fish, add to it seasoning, whipped cream, whipped aspic and melted gelatine. Pour into moulds; turn out when set. Put lettuce in center, with mayonnaise over; chop tomato aspic and force it round.

FISH CAKES

2 lbs. cold boiled fish
½ lb. cold potatoes
2 eggs
4 tablespoons bread crumbs
1 oz. butter
Pepper and salt

Mash the potatoes; break the fish into small pieces, removing all skin and bone; mix it with the potatoes, seasoning and butter; drop in one yolk of egg; mix well and knead into cakes, using a little flour for the purpose. Roll in egg and bread crumbs and fry in hot lard.

MEAT AND FISH SAUCES

WHITE SAUCE

I level tablespoon of butter
Same of flour
I cup liquid, either milk and water or milk.
Spoon salt
Few grains pepper

Melt the butter in smooth saucepan; stir in the dry flour; cook and stir until frothy all over; then draw to a cooler part of stove and stir while adding the liquid, hot or cold. Cook until thick, stirring till smooth.

THICK WHITE OR CREAM SAUCE

Make as above, but use double quantities of flour and butter.

BECHAMEL SAUCE

I tablespoon each of flour and butter
½ cup each thin cream and white stock, chicken or veal
Salt and pepper to taste

Prepare same manner as White Sauce.

HOLLANDAISE SAUCE

Cream ½ cup butter; add gradually 2 beaten egg yolks; stir well. Add I tablespoon lemon juice, dash each of salt and cayenne. Add ½ cup boiling water, and stir over boiling water till thick as boiled custard. Serve immediately.

SAUCE TARTARE

Make I cup mayonnaise (see Salads). Chop very fine one tablespoon each of capers, olives, green cucumber pickle, and parsley. Press in a cloth till quite dry. Blend gradually with the mayonnaise. For fried or broiled fish.

MAITRE D'HOTEL BUTTER

Cream 2 tablespoons butter; add gradually ½ teaspoon salt, ¼ teaspoon white pepper, I tablespoon each of lemon juice and chopped parsley. Keep very cold. Serve with fried fish or broiled steak.

HORSE-RADISH SAUCE

Cream 2 tablespoons butter; add 2 tablespoons fresh grated horseradish, I tablespoon very thick cream, ½ teaspoon lemon juice. Keep very cold. Good with corned beef.

MINT SAUCE

I cup chopped green mint leaves, ½ cup vinegar, ¼ cup powdered sugar. Mix one hour before serving with lamb.

HINTS TO HOUSEWIVES

Salt thrown on burning fat prevents odor.

Horseradish prevents mold in vinegar.

Use sour milk and soda for baking.

Stale crumbs in bread pans cause mold.

Sweet milk polishes patent leather.

To remove grease from cambric use flannel.

Borax, soap and warm water clean brass.

Egg yolk and warm water remove coffee stains.

Lemon and salt remove rust stains.

Turpentine cleans tar from cloth.

Common salt removes egg stains from spoons.

Dip fish in boiling water before scaling.

Quicklime drives away ants.

Turpentine in boiling water whitens the wash.

Rub stained knives with raw potato.

A letter closed with the white of an egg can not be opened by the steam of boiling water, as the heat only adds to its firmness.

The best and quickest way to sprinkle clothes for ironing is to use a small clean brush dipped in a bowl of clean water.

RAISINS WITH NUTS

Scientific analysis shows that raisins eaten with nuts constitute a perfect health food, supplying every element that is required for nourishing the system, enriching the blood and invigorating the digestive organs.

Green vegetables should be taken daily. It is not sufficiently known that green vegetables are splendid purifiers of the blood. They should, however, be well cooked. Half-cooked vegetables are most indigestible.

1915 Boosters at the State Fair

N August 29th a delegation of one hundred boosters from San Francisco visited Sacramento and the State Fair, the main object being to boom the 1915 Exposition in San Francisco.

Mr. L. M. King, Secrtary of the Merchants Association of Sacramento, conceived the idea of according this delegation a special welcome to the Capitol City, and through the good offices of Mr. McKillip, Manager of the Sacramento Electric, Gas and Railway Company, secured the use of three cars for the day, free of charge, for transporting the delegation from the Sacramento depot to the fair grounds.

The car attendants were all dressed in white, which naturally lent a very festive appearance to the entire affair.

Cut No. 1 shows one of the cars as decorated with the booster banner.

Cut No. 2 shows the train ready to leave the Sacramento depot, from which point they proceeded directly to the fair grounds.

Mr. McKillip also furnished each booster with a large red carnation as a badge of identification.

PERSONALS

Owing to poor health, Mr. Walter Webber, formerly of the New Amsterdam Gas Company of New York, and employed successively as bookkeeper, collector and counter clerk by the San Francisco Gas and Electric Company since 1906, resigned from his position, and returned to his home in England. Prior to his departure, as a tribute to his popularity, his fellow-workers at the office presented him with a handsome gold watch fob. The illustration does not show the inscription, which reads:

Presented to Walter Webber,
as a token of the esteem of
his co-workers of the San
Francisco Gas and
Electric Company
September 30, 1911

Mr. F. E. Oldis, head of the Bookkeeping Department of the San Francisco Company, met with an unfortunate accident on Sunday evening, October 1st, last. Mr. Oldis was returning from Monterey in his automobile, and while "cranking" the machine, the starting crank flew back and shattered his right arm at the elbow. An X-ray examination disclosed the necessity of an immediate operation, which was performed at St. Mary's Hospital. It is expected that the broken bones in his arm will knit in three weeks, but should they not, a second operation will be required. Mr. Oldis was just returning from a three-weeks' vacation at the time of the accident, which occured at Haight and Stanyan Streets, within a few blocks of his home.

L. F. Galbraith, who for the past year has been electrical superintendent of the Pacific Gas and Electric Company, has severed his connection with the company to take a course of study in his particular line, after which he will enter a larger field.

Mr. Galbraith has made a host of friends in this city through his courtesy and general affability, and it is with deep regret that his many friends see him depart. In token of their appreciation and friendship, the linemen of the company have presented him with a watch-fob and diamond-studded locket, and the office force gave him a gold scarfpin.

Mr. Galbraith is one of the most popular men in the employ of the company, and it is not alone his fellow-employees who regret his leaving, but all others in this city who had the pleasure of knowing him.

San Rafael Tocsin, Sept. 9, 1911.

Mr. Henry Bostwick, Secretary to the President, sailed from San Francisco, Wednesday, October 4th, 1911, on the S. S. "Siberia," for a vacation trip to Honolulu. Mr. Bostwick will remain in the Islands over one steamer, and during his sojourn there will take in the volcanoes and all points of interest. Mr. Bostwick, in addition to being Secretary to the President of the Pacific Gas and Electric Company, is also Assistant Secretary of the Pacific Coast Gas Association, and is entitled to a well-earned rest, especially after the added duties and responsibilities with which he was burdened during the recent Annual Convention of the Association.

We extend to "Harry" an enjoyable trip.

Angus McDonald, who, for nineteen years has been employed by the Pacific Gas and Electric Company at Alta, has been transferred to Sacramento at his own request. His long residence in the Alta District has made him an efficient ditch tender and an expert snowshoer. His desire for a milder climate was the only reason for the change. G. A. Wilkes, who has been employed at one of the mountain stations of the company, has been named to fill McDonald's vacancy.

Grass Valley Union, August 26.

Don C. Ray, County Superintendent for the Pacific Gas and Electric Company, was a Concord visitor late last week, says the Transcript. Mr. Ray is an untiring worker for his company, and he has demonstrated his fitness many times since he has been here during the last few months. He is ever-watchful of the interests of the company and its patrons. All grievances are treated with due consideration and courtesy. Mr. Ray has promised us better street lights, which have been very poor this summer.

Martinez Gazette, Sept. 23, 1911.

The local branch of the General Electric Company, through Manager T. E. Bibbins, has issued a challenge under date of September 23rd, 1911, for a game of baseball between a picked team from the General Electric Company, and a picked team from the employees of the Pacific Gas and Electric Company.

This challenge was addressed to Mr. Frank Varney of the Pacific Gas and Electric Company, who has, under date of September 28th, accepted the challenge; the game to be played some Saturday afternoon during the month of October. The losing team will pay for a dinner.

We beg to compliment Mr. Bibbins upon the temerity displayed in issuing this challenge, and can only sincerely hope that the pleasant business relations existing between the General Electric Company will, in no way, be interfered with on account of the severe "drubbing," which the Pacific team will administer, and we also trust the General Electric Company will provide a GOOD dinner.

R. J. C.

On September 20th, 1910, Messrs. A. F. Hockenbeamer, Second Vice-President, D. H. Foote, Secretary, and Jos. C. Love, Chief Auditor, of the Pacific Gas and Electric Company, were tendered an invitation by the employees of these three departments to attend a dinner to be given by the latter in honor of these three gentlemen. The date was set for Tuesday evening, October 3d, 1911, at Tait's, and for quite a few days prior thereto all other social topics were tabooed in its favor. The work of arranging the dinner was placed in the able hands of the following committee:

Mr. B. J. Crowley (Chairman), Second Vice-President's Department; Mr. John D. Rosie, Secretary's Office; Mr. C. R. Stevens, Auditor's Office.

Over thirty covers were laid, and harmony and good-fellowship (the two kindred objects of the banquet) reigned supreme. The banquet hall was beautifully decorated for the occasion in the style of a Japanese tea-garden, augmented by huge bouquets of chrysanthemums. Mr. Crowley and his committee were highly complimented on the successful manner in which the dinner was arranged.

Mr. Kendal I. Dazey, the guardian of inner portals of the Vice-President and Treasurer's office, presided as Toastmaster of the occasion, and very few escaped without contributing in some way to the evening's entertainment.

On October 15th a daughter was born to Mrs. F. E. Wilkinson, wife of F. E. Wilkinson of the Electric Distribution Department.

QUESTION BOX

Ask questions. Any one of the severol thousand men and women in the Pacific Gas and Electric Company who wishes information pertaining to any phase of the company's work or concerning matters of common interest to residents of any section reached by the company's lines is urged to use this department freely. Send your questions to the magazine. There will be no charge.

Question.—(a) What is meant by Power Factor?

(b) What effect has Power Factor on the operation of power lines and motors?

Answer (a).—Briefly, power factor may be defined as the ratio of the true watts of an alternating current circuit to the apparent watts (or product of volts times amperes). This ratio is generally expressed as a percentage and is used to determine the true watts by multiplying the apparent watts by the power factor.

Thus, in a case of a single-phase motor load, if the indicating ammeter reads 100 amperes and the indicating voltmeter reads 220 volts, the apparent watts = 100 × 220 = 22,000.

Assuming a power factor (which can be generally obtained from the manufacturer's specifications) of, say, 85%, the true watts = 22,000 × .85 = 18,700 watts.

In an alternating current circuit, the current flowing depends upon the inductance and capacity of the circuit. The effect of an inductive load is to produce a current which is out of phase with the voltage, or a "lagging" current. For equal kilowatt delivery, a circuit having a lagging current must carry more current than a circuit having its current in phase with its voltage.

The principal loss in a circuit is due to resistance or copper losses, and if the current is increased, the losses in the circuit are increased.

(b) The kilowatt carrying capacity of a power line depends upon the I^2R or copper losses; therefore, if the current flowing in a line is increased due to inductance, which results in a lower power factor, the losses in the line increase as the square of the current. This loss results in a lowering of voltage at the load end of the line, thus causing poor regulation.

The windings of motors are designed for a limited heating due to current flowing in same.

The effect upon a motor is an increase of current due to lower voltage supplied. This increased current causes heating in the motor windings, and limits the output of the motor.

Question.—What is the advantage of having high pressure steam in the street mains instead of low pressure or exhaust steam?

Answer.—The high pressure steam insures a constant pressure and temperature in the consumer's radiation system. Where a reducing valve is installed in each service, the pressure on the house side will remain constant, whether one radiataor or fifty are being used. Where low pressure steam is used in the main, the consumer's radiator pressure and consequently the temperature, will vary the pressure in the main line.

Question.—If trouble is experienced in a steam service supplied by the San Francisco Gas and Electric Company, to whom should this trouble be reported?

Answer.—The company maintains a crew of competent men stationed at the various steam generating plants, whose duty it is to attend immediately to any complaint sent in from a steam service. By notifying the telephone operator of the company of any trouble, or lack of service, one of these men will be sent immediately to attend to it.

Question.—Outside of the question of cost, what is the advantage in having a building heated from a street steam main instead of a house plant?

Answer.—In new buildings where no heater has been installed valuable space may be saved by using a street service. In any case the necessity of having to watch two fires, one under the house boiler and one under the water heater, is done away with. Another advantage is the assurance of a constant supply of hot water, which is possible with an oil furnace only when the latter is run night and day.

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THE PACIFIC GAS AND ELECTRIC COMPANY

SUPPLIES HEAT, LIGHT AND POWER TO

Place.	Population.
Agua Caliente	50
*Alameda	23,383
**Albany	800
‡Alta	200
Alto	30
Alvarado	200
Allegheny	200
‡Amador	200
Angels Camp	3,200
Antioch	3,000
‡Auburn	2,376
Baden	1,500
Barber	200
**Belmont	600
Belvedere	481
Benicia	3,360
Ben Lomond	800
**Berkeley	40,434
Bethany	200
Big Oak Flat	150
Biggs	750
Bohemian Grove	25
Brentwood	200
Brighton	100
Broderick	500
‡Brown's Valley	50
**Burlingame	5,000
Byron	200
Campbell	1,000
Camp Meeker	200
Cement	1,500
Centerville	500
‡Centerville	20
**Chico	13,000
Chittenden	50
**Colusa	1,582
‡Colfax	400
**Colma	500
Concord	1,500
Cordelia	150
Corte Madera	350
Cordova	25
Cornwall	300
Crockett	2,500
Crow's Landing	375
Davenport	1,000
‡Davis	750
Decoto	350
‡Dixon	1,000
Dobbins	50
‡Drytown	100
Duncan Mills	150
Durham	500
‡Dutch Flat	400
Eagle Nest	50
‡East Auburn	1,500
**Easton	500
**East San Jose	1,500
Eckley	20
Eldridge	1,000
‡Electra	50
Elmira	150
El Verano	100
Emerald	50
**Emeryville	2,000
Encinal	20
Fairfax	250
Fairfield	800
**Fair Oaks	250
Felton	300
Folsom	1,500
Forestville	100
*Fresno	24,892
Gilroy	2,000
Glen Ellen	500
‡Gold Run	100
Grafton	350
†Grass Valley	4,520
Gridley	1,800
Groveland	50
Guerneville	500
Hammonton	500
**Hayward	4,000
Hollister	3,000
Ignacio	50
‡Ione	900
Irvington	1,000
‡Jackson	2,035
‡Jackson Gate	50
Kennedy Flat	50
**Kentfield	200
Knight's Landing	350
Larkspur	594
Lawrence	100
‡Lincoln	1,402
Live Oak	200
Livingston	200
Livermore	2,250
‡Loomis	150
Los Altos	200
Los Gatos	3,000
Manlove	50
Mare Island	500
‡Martell	25
Martinez	5,000
**Marysville	5,430
Mayfield	1,500
Mayhew	50
**Menlo Park	1,500
Meridian	300
Middle River	75
Mill's College	150
**Milbrae	300
Mills	350
Mill Valley	2,551
Mission San Jose	500
Mokelumne Hill	150
Monte Rio	50
Mountain View	2,500
**Napa	5,791
Napa Junction	250
†Nevada City	2,689
Newark	700
‡Newcastle	600
New Chicago	25
Newman	1,000
Niles	800
Novato	250
**Oakland	225,000
**Oak Park	8,000
Occidental	400
Ophir	50
Oroville	2,500
Orwood	50
Oswald	25
Pacheco	200
**Palo Alto	6,000
Patterson	100
Penon Blanco	25
‡Penryn	250
Perkins	200
**Petaluma	5,880
**Piedmont	2,000
Pike City	200
Pinole	1,500
Pittsburg	2,200
Pleasanton	2,000
Port Costa	600
**Redwood City	3,500
**Richmond	6,802
Rio Vista	884
‡Rocklin	1,026
Rodeo	100
‡Roseville	2,608
**Ross	556
Routier	30
***Sacramento	52,000
San Andreas	200
**San Anselmo	1,531
**San Bruno	1,500
**San Carlos	100
**San Francisco	416,912
**San Jose	40,000
San Juan	150
**San Leandro	4,000
**San Lorenzo	100
**San Mateo	7,000
San Pablo	1,000
**San Quentin Prison	1,600
**San Rafael	5,934
Santa Clara	8,000
Santa Cruz	11,146
**Santa Rosa	7,817
Saratoga	200
Sargent	50
Sausalito	2,383
**Sebastopol	1,233
Selby	100
Smartsville	300
Sonoma	1,200
**So. San Francisco	2,500
Stanford University	2,000
**Stege	100
‡Stockton	23,253
Suisun	1,200
Sunnyvale	2,000
‡Sutter Creek	2,000
Terminus	50
Tiburon	100
Tormey	150
†Towle	200
Tracy	1,200
Vacaville	1,177
**Vallejo	11,340
Vallejo Junction	10
Vernalis	50
Vineburg	200
Walnut Creek	350
Warm Springs	200
Watsonville	4,446
Wheatland	1,400
Winters	1,200
**Woodland	3,187
Yolo	350
**Yuba City	1,160

*—Gas	48,275
**—Gas and Electricity	847,139
‡—Electricity and Water	41,445
***—Gas, Elec. and Street Car Service	52,000
†—Electricity, Gas and Water	7,409
Unmarked Electricity only	115,807
	1,111,575

Service Furnished.	Number of Towns.	Total Population.
Electricity	204	1,062,866
Gas	52	946,328
Water	20	42,894
Street Car	1	52,000

EMPLOYS 3,500 people
OPERATES 11 hydro electric plants in the mountains
3 steam-driven electric plants in big cities
18 gas works

SERVES ⅔ of California's population
30 of California's 56 counties
An area of 37,950 square miles
¾ the size of New York state
½ the size of all the New England states combined

PACIFIC GAS AND ELECTRIC MAGAZINE

Published Monthly by
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO

VOL. 3 NOVEMBER, 1911 NO. 6

IRRIGATION CANAL, PLACER WATER DISTRICT

SAN FRANCISCO "1915" THE EXPOSITION CITY

ASSOCIATED OIL COMPANY

GENERAL OFFICE

Wells Fargo Building

San Francisco

Telephone Kearny 4800

FOR SALE.

The Pacific Gas and Electric Company has for sale the following machinery:

ENGINES

MAKE	H. P.	COMPOUND	CYLINDER	STROKE	RPM	PRESSURE	FLY WHEEL	CONDENSER
Ball	185	Tandem	12"-20"	16"	250	115 lbs.	74" D 15" F. Belt	Surface
Ball	350	Tandem	18"-28"	18"	208	120 lbs.	86" D 17" F. Belt	Surface
Ball	150	Cross	13"-22"	12"	300	125 lbs.	75" D 17" F. Belt	None
Hamilton-Corliss	450	Tandem	22⅜"-42⅞"	48"	75	110 lbs.	22' D 1½" Rope 14 Grooves	Surface
McIntosh-Seymour	400	Tandem	15"-30"	36"	136	155 lbs.	12' D 1¼" Rope 24 Grooves	Surface
Westinghouse	75	Cross Vertical	10"-14"	12"	350	125 lbs.	75" D 15¼" F. Belt	None
Ball & Wood	700	Cross Vertical	21½"-45½	20"	150	155 lbs.	Direct conected to Gen. Elec. Co. Rev. Field Generator 500 K. W. 3 phase 2300 volts 60 cycles	Surface

BOILERS

One Heine Water Tube Boiler—200 HP., 135 lb. pressure, 87 tubes 3¼" x 16'.

For further information and prices, kindly communicate direct with Mr. GEO. C. ROBB, Superintendent of Supplies, 445 Sutter Street, San Francisco.

Pacific Gas and Electric Magazine

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Yearly Subscription $1.50

Single Copies each 15 cents

1—Face of Fordyce Dam

2—Fordyce Dam, showing location of new tunnel

PACIFIC GAS AND ELECTRIC MAGAZINE

VOL. III NOVEMBER, 1911 No. 6

Big Work

Reconstruction—Fordyce Dam

By E. E. DODGE, Engineering Department.

LAKE FORDYCE, one of the Company's largest storage reservoirs, with an area of approximately 510 acres, and 875,000,000 cubic feet capacity, is situated far in the eastern part of Placer County, and about seven miles from the summit of the Sierra Nevada Mountains. The lake is about eight miles due north of the Southern Pacific Railway tracks passing Cisco station, and can best be described as an immense basin, surrounded by high and precipitous mountains of granite, and consequently almost inaccessible except by foot travel or by horse-back over rough mountain trails.

The retaining dam at Fordyce is practically 800 feet long, 139 feet thick at the foundation, five feet across the top, and 92 feet high. This dam was built years ago for the purpose of storing water in conjunction with the old South Yuba Water Company system. The face of the dam is at present sheathed with heavy planking (see Cut No. 1). In the spring of 1911 it was decided to put in a concrete cut-off wall along the entire toe of the dam, and also to reinforce the crest of the dam, block the old spillway, and build a new outlet tunnel. Cut No. 2 shows the excavation necessary to establish a permanent and solid foundation at the toe of the dam for the cut-off wall.

In order to carry on this construction work, it was necessary to practically empty the lake of its water (see Cut No. 3), and establish a permanent headquarters camp adjacent to the work to care for the two hundred-odd men needed in this reconstruction.

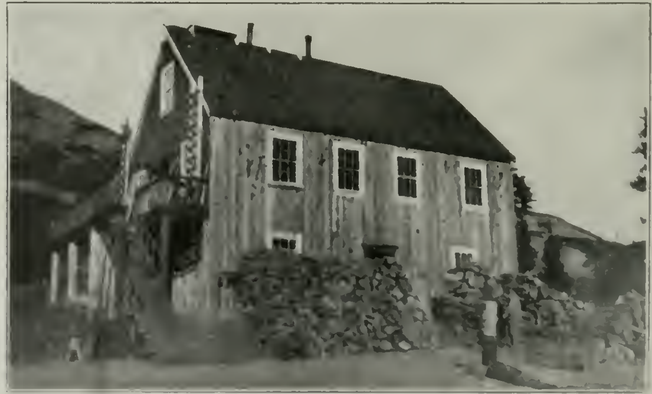
Owing to the almost impassable mountain barriers between Cisco, on the line of the Southern Pacific, and Lake Fordyce, the immense amount of construction material, consisting of heavy machinery, such as air compressors, boilers, hoisting equipment, tram cars, etc., necessary to carry on this gigantic work, was taken in a long detour from Truckee north by way of Weber Lake, a two-days' haul, and down into the northern end of Lake Fordyce, thence by boat and rafts to the dam. The camp supplies for the commissary were taken in by pack trains from Cisco over the mountains. When this work is entirely completed, the Fordyce Dam will be in excellent condition for many years to come.

Fordyce is at an altitude of 6,300 feet above sea level, and even as late as July 1st oftimes snow remains upon the ground, and the nights are sharp with heavy frost. The first winter snows fell at Fordyce, October 25th, 1911, and scum ice is beginning

3—Bed of Lake Fordyce

to form. Consequently, the season when work can be performed in these mountains is extremely short. Eighteen to twenty feet of snow is the usual winter's depth, and the headquarters house shown in illustration No. 4 is oftimes buried, so that the two lake tenders are compelled to enter and leave by the window shown in the extreme top of the gable end.

This picture also shows wood being stored for the long winter season, and on the porch are a number of Norwegian skis, which are used in traveling over the country during the winter months. Ed. Roenig, in charge of Lake Fordyce, has lived in these mountains as caretaker of Lake Fordyce, Sterling and Meadow Lake for 39 years. His only companion is Gus Anderson, and many times



4—Headquarters House, Lake Fordyce

these two rugged Scandinavians pass several months during the extreme winter, snowed in and ice-bound, without ever seeing a human being. When it is possible to get out, and the snow is tightly packed, they oftimes take a little jaunt on their skis over the mountains to Cisco and back again, a distance of about 16 miles. Uphill and downhill they wend their way, being experts on snow shoes, and where the going is good they indulge in long coasting spurts of several miles.

A large portion of the bed of Lake Fordyce was at one time rich meadow and timber land, and, in fact, a large ranch occupied one end of the valley. In cut No. 3 old stumps of what were at one time standing trees can be seen, and are now almost entirely submerged except at extremely low water.

Lake Fordyce abounds in fine trout, which are being preserved by the Company during this construction work; small dams having been built and sufficient water retained to care for the fish until the lake is again refilled.

* * *

Electric Power as an Agent in the Manufacture of Cement

By J. O. HANSEN, Superintendent, San Jose Power Division.

J. O. Hansen

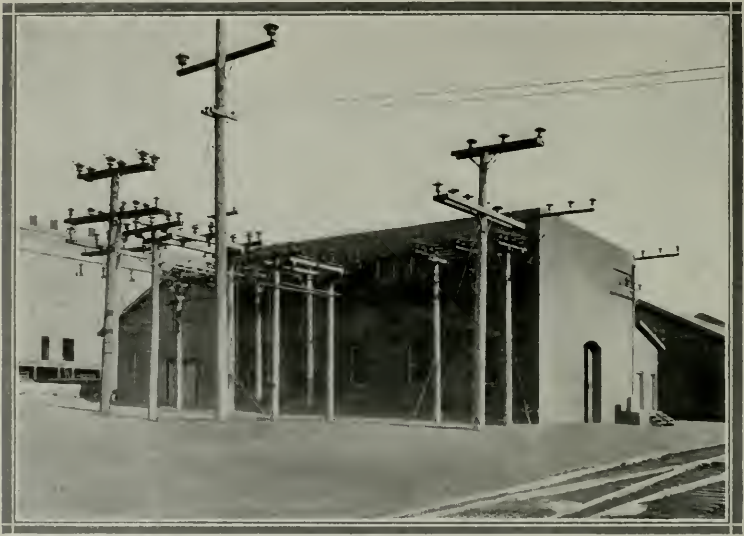
In the September, 1911 number of this magazine appeared an article entitled "Portland Cement Manufacture," describing the process used by the Santa Cruz Portland Cement Company, located at Davenport, Cal.

This article is intended to describe the means by which the Pacific Gas and Electric Company serves this industry with electric power from its network of transmission lines.

The plants of the Santa Cruz Portland Cement Company are located only a few hundred yards from the Pacific Ocean, about twelve miles north of Santa Cruz. To connect this point with the transmission lines of the Pacific Gas and Electric Company, it was necessary to build about 34 miles of line, tapping the main 60,000-volt lines about 3½ miles east of Mountain View. The route takes it near the towns of Bonny Doon, Boulder Creek and Saratoga Summit.

Each conductor of the line is made up of seven aluminum wires in the form of a cable, and there are three of these cables to transmit the three-phase power. In order to operate the lines and give a continuity of service, the first part of the line consists of two circuits, each being a tap on each of the main lines. Attendants are located at Mountain View to switch these lines at will.

The last two miles in the vicinity of the cement works is also a twin line. It has been found by experience that the combination of salt fog and cement dust on the surface of the insulators gives a fairly good leakage path for the high potential current to "leak" to ground. If the current only "leaked" to ground and did nothing else, there would probably be no need of the duplicate construction, but the leak causes a "short" and results in an interruption to the service. By having a spare line, as it were, the insulators are kept clean by wiping at definite intervals while service is supplied



1—Davenport Substation

over the other line. It has been found that by oiling the surface of the insulators with a special oil, when wiping, that the water from fogs and rain flows off as it does from a "duck's back," resulting in less frequent interruptions.

The transmission line terminates at the Davenport substation, a building 40 x 60 feet constructed entirely of concrete and shown in Fig. 1. It will be observed from Fig. 2 that there are three 60-kilovolt lines entering the station through three outside pole type 60-kilovolt air switches. Numbers 1 and 2 feed into a 60-kilovolt sectionalized station bus, through non-automatic oil switches, shown in Fig. 3. Normally, transformer banks No. 1 and No. 2 are fed off these sections of bus.

Branch line No. 3, after passing through the standard outside switch, enters the building and supplies No. 3 bank of transformers through an automatic overload release oil switch. This bank of transformers is capable of delivering 2,250 kilowatts at 22,000 volts, and is used for supplying the Coast Counties Light and Power Company, who, in turn, distribute in Santa Cruz, Monterey, San Benito and Santa Clara Counties.

Banks No. 1 and No. 2 have a combined capacity of 7,800 kilowatts. They step the voltage from 60,000 to 2,300, at which it is metered to the Cement Company.

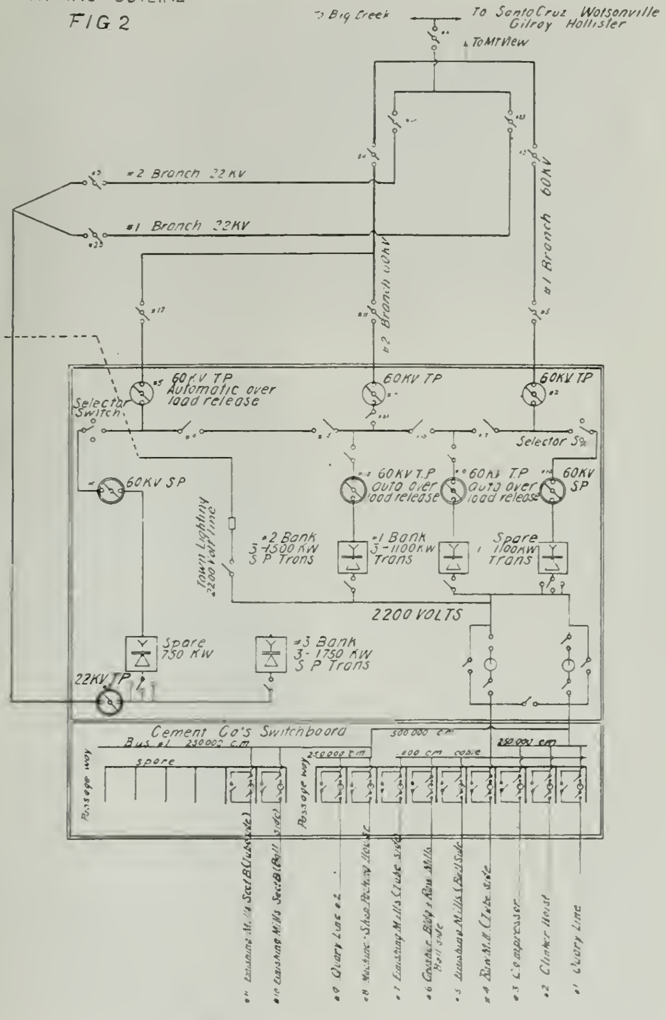
Referring again to Fig. 2, it is seen that all transformers are of the single-phase type, and there is a total of 10,050 kilowatt capacity with a reserve in spare transformers of 1,850 kilowatts. All of the transformers are water cooled, the supply coming from San Vincente Creek, four miles distant.

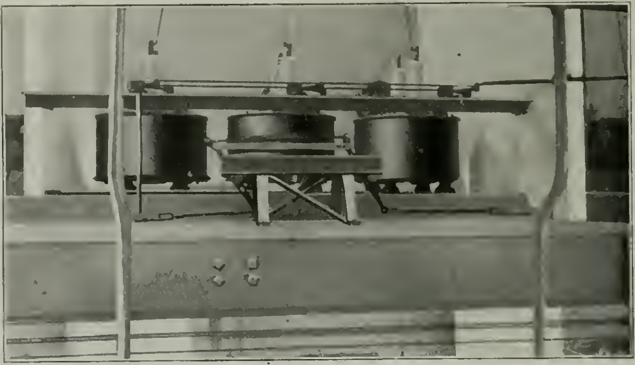
The switchboard and switch compartments are shown in Fig. 4. The entire station is controlled from this board. On account of its compactness, the load on all of the apparatus is seen at a glance. The low-tension oil switches are enclosed in concrete compart-

DAVENPORT SUB STATION

WIRING OUTLINE

FIG 2


To Big Creek
To Santa Cruz Watsonville Gilroy Hollister
To Mt View
#2 Branch 22 KV
#1 Branch 22KV
#2 Branch 60KV
#1 Branch 60KV
60KV TP Automatic over load release
60KV TP
60KV TP
Selector Switch
Selector Sw
60KV SP
60KV T.P auto over load release
60KV T.P auto over load release
60KV SP
Town Lighting 2200 Volt line
#2 Bank 3-1500 KW S P Trans
#1 Bank 3-1100KW Trans
Spare 1100KW Trans
2200 VOLTS
Spare 750 KW
#3 Bank 3-1750 KW S P Trans
22KV TP
Cement Co's Switchboard
Bus #1 250000 c.m
500000 c.m
250000 c.m
250000 c.m
000 cm cable
250000 cm
spare
Passage way
Passage way
#11 Finishing Mills Sect B (Tube side)
#10 Finishing Mills Sect B (Roll side)
#9 Quarry Line #2
#8 Machine Shop Packing House
#7 Finishing Mills (Tube side)
#6 Crusher Bldg & Raw Mills Roll side
#5 Finishing Mills (Roll Side)
#4 Raw Mill (Tube side)
#3 Compressor
#2 Clinker Hoist
#1 Quarry Line

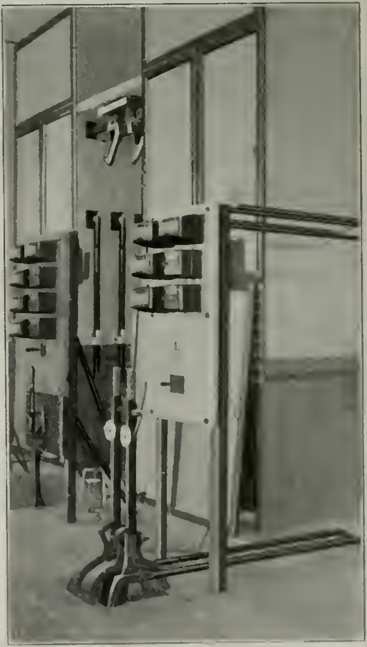


3—60-Kilovolt Automatic Overload Release Oil Switch

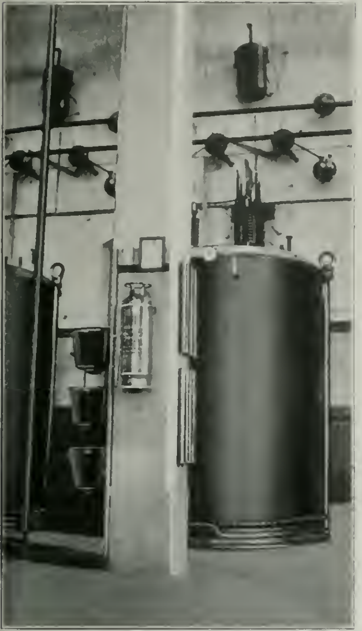
ments for the double purpose of protecting them from cement dust as well as to prevent the spread of damage should an arc get started.

Everything about the station has been made as nearly fire-proof as possible, but at times there is a liability of fire from ignited oil, so the station is equipped with fire-fighting apparatus located in two stations, one of which is shown in Fig. 5. The apparatus consists of one three-gallon chemical extinguisher, six dry-powder extinguishers, and three fibre buckets filled with dry sand.

In a separate room in a concrete lean-to side of the substation proper, the cement company have installed their feeder switches. They have adhered to the practice of separating everything in concrete compartments, so that trouble on one switch does not involve any others. The oil switches are each equipped with disconnecting switches so that without interrupting the service the oil switch can be cut out and worked in with safety to the men. Sand has been placed in the pits below the switches to absorb any oil that may get out of the switch tanks. There are fifteen switches and feeder compartments in all, but only eleven are in service at the present time, the balance being intended for future growth.

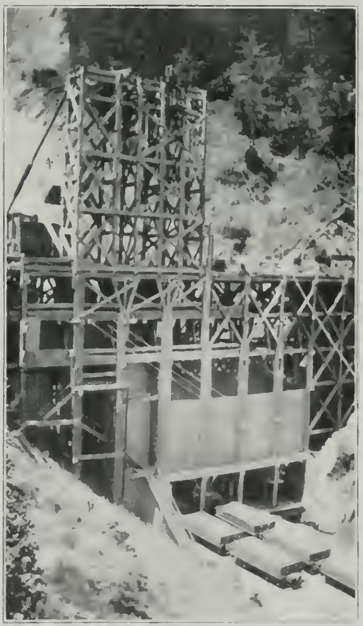


4—Meter Panels and Switch Handles



5—Fire Station and 750-Kilowatt Transformers

There are seven three-phase aerial circuits, each consisting of three 250,000 circular mils copper cables which supply the raw mill, kiln building, compressor building, and finishing mill. One three-phase circuit, consisting of three No. 3 wires, supplies the hoisting motor, also one three-phase circuit, consisting of three No. 4 wires, supplies the stock house motors. The remaining two feeders supply the quarry; they consist each of three No. 0 wires. All lines are aerial, supported on 20,000-volt porcelain insulators. The insulators are found to be ample, even though they become coated with cement dust. No shield or hood is used on them, though the dead-end strain bobs are all protected with wooden boxes. The cement company has 52 motors, aggregating 10,070 horsepower, which take the maximum supply of 2,200 volts. They have a number of other motors taking only 440 volts. These are used for hoisting and variable speed work. Then there are a few smaller motors taking only 110 volts. Transformers for reducing the supply of 2,200 volts to 440 and 110 volts are located at various points about the works. The largest motors have a capacity of 800 horsepower, and are used to drive the air compressors. The smallest motor has a capacity of one-half horsepower, is located in the chemist's laboratory and used in the testing of oils. The majority of the motors are either 150 horsepower or 250 horsepower in capacity and are used for operating the long steel tubes. Each motor has its switchboard close by, so that in operating the attendant has the machinery in full view. This mode of drive is dis-



6—Rock Crusher and Bunkers

tinctive at this plant and has saved much expense in repairs to switches, belts, gears, etc. All of the motors thus far mentioned are of the constant-speed type and need no further comment.

As noted before, however, there are some variable-speed motors in use. The largest, a 150-horsepower, 440-volt motor, operates the Flory hoist at the quarry. This hoist has a four-ton skip in which the limestone is delivered to the bunkers from the quarry as shown in Fig. 6. The hoist over the clinker pile, shown prominently in photos in the previous issue of this magazine, is operated by 110-horsepower, 2,080-volt, variable-speed motor.

Differing from all the other motors and representing the latest development in alternating-current motors of the variable-speed type, is the installation of the star delta motors operating motors operating the kilns. There are fourteen motors of this type, each rated at 30 horsepower, taking current at 440 volts. The lowest speed obtainable is 150 revolutions per minute, when the windings are connected in delta; while the highest speed to be reached is 690 revolutions per minute, when the windings are connected in star, and the motors will operate at any speed between these limits without heating. These motors are located in a ventilated tunnel under the kiln room, but the control is brought out to the end of the kiln where the attendant can watch the fires and adjust the speed to any desirable point, without leaving his post.

The operation of motors in a Cement Plant is a severe condition to impose on any piece of electrical machinery on account of the ever-present cement dust in the atmosphere. It is, therefore, necessary to closely watch the bearings to see that each is supplied with plenty of oil and the oil rings are revolving. Once each year the oil is drained out of the bearings and filtered and made perfectly clean before the new or filtered oil is put back. The result of this vigilence is maximum output efficiency, as no kiln or tubes are ever compelled to remain idle due to hot bearings.

Thus it is seen how electric power, derived from water power 175 miles away, takes the clay from the ground and makes cement of it, by the processes of grinding, mixing and burning.

A Lullaby

By G. V. J., Pacific Gas and Electric Company, San Francisco.

Slumber, my pretty one; my darling, sleep;
Round thy rosy lips let sweet smiles creep;
Mother watches o'er thee with fondest care;
Her song is but the echo of a soul-inspired prayer—
For thee, dear little one. Oh, rest.

Morning's balmy waking will coax thy roguish eyes
To part those drooping lashes, where laughter underlies;
Thy romps and ceaseless prattle will consecrate the day,
And smiles and tears will battle for supremacy.
Then rest thee, my darling, rest.

Mother's love will tend thee in thy tender years,
Mother's heart befriend thee when hope is chilled by tears;
Then rest thee, little sleeper, for I a vigil keep;
Dream of angels' visits. Sleep, my sweet one, sleep.
Sleep; Sleep; Sleep.

The Heating Value of Gas

By F. C. JONES, Chemist, Oakland District.

THE quantity of energy in the universe is always constant. There is never any more or any less energy; no matter what form it may take, as heat, light, electric or chemical, no matter how these forms are changed from one into another, the sum total is always the same. This is the familiar law of the conservation of energy.

Perfectly analogous is the law of conservation of matter. The quantity of matter, regardless of the changes it undergoes, is always constant. Light a match and it quickly disappears before your eyes; but the water formed and the oxides of carbon, of phosphorus and of sulphur are exactly equal in weight to the weight of the match plus the oxygen consumed in burning it.

As there are many forms of energy, so are there endless kinds of matter. Whatever its kind, however, matter is always found in one of the three familiar states—solid, liquid or gaseous. Solids have definite shape and definite volume, liquids have definite volume, but no definite shape, they exactly fit, except at the top, whatever vessels contain them. Gases have neither definite shape nor definite volume; both of these properties depending on the confining vessel. Gas then, is a fluid of perfect elasticity, and, unconfined, it would expand indefinitely.

Matter in any of its three states is always made up of molecules, and these molecules are always in motion, continually colliding, and the shocks produced by these collisions are what we call heat. This is known as the mechanical or kinetic theory of heat.

Now, chemical changes, as you know, always result in disturbances among the molecules. The molecules are disrupted, their parts or atoms recombining to form new molecules, and we could expect that heat changes would also result, as is indeed the case. All chemical actions cause heat changes—either heat is absorbed and the reaction is said to be endothermic, or heat is liberated and the reaction is exothermic.

The unit for measuring quantity of heat is the British Thermal Unit. It is that heat necessary to raise the temperature of one pound of pure water 1° Fahrenheit at 39.2° F., the maximum density of water.

In the absorption or the liberation of heat by any given amount of a substance, a quantitative relation is always preserved. If a substance in oxidizing gives out heat, the amount is always the same for a given weight of the substance. If a pound of iron slowly rusts into oxide of iron, the heat generated is exactly the same as would be generated if the pound of iron were quickly burned in pure oxygen with brilliant light. If combustion takes place in stages, that is, if a substance is oxidized into a product, which, in turn, is capable of further oxidation, the final result, in terms of heat, will be the same. An example will make this clear. One pound of carbon burned to carbon monoxide develops 4,451 B. T. U., and 2⅓ pounds of carbon monoxide are formed. If this amount of carbon monoxide is then burned to carbon dioxide, there are developed 10,093 B. T. U., which added to 4,451 gives 14,544, the heat of combustion of carbon when burned directly to carbon dioxide.

When you light the gas at the stove or the light fixture, you simply start a series of chemical reactions, a series of rapid oxidations which continue so long as the flow of gas and the supply of oxygen hold out. The gas contains just two elementary substances that will burn—carbon and hydrogen.

Part of the hydrogen exists in the gas uncombined, part is combined with carbon, and part of the carbon is combined with oxygen as carbon monoxide. We have, then, as combustibles—hydrogen, hydro-carbons and carbon monoxide.

Hyrdogen has a heating value of 62,100 B. T. U. per pound; carbon, 14,544.

The various combinations of the two have a value intermediate between their separate values, not exactly, however, in proportion to the per cent of each, for each of the compounds of hydrogen and carbon has liberated a certain amount of heat when it was formed, and this heat of formation is, of course, not recovered when the compound is burned.

Taking the heat units by volume instead of by weight, hydrogen has 344 per cubic foot, the illuminating hydro-carbons an average of 2,000, carbon monoxide 343, and methane or marsh gas 1073. We usually have such a mixture of these in our gas as to give it a value of 650 B. T. U. per cubic foot. This means that one cubic foot of gas could develop heat enough to raise the temperature to 650 pounds of water 1° F. if the gas were perfectly consumed, and all the heat went into the water, or that it would raise the temperature of 65 pounds of water 10° F., or any other combination whose product is 650.

Heating value, then, is something inherent in the gas, depending absolutely on its chemical composition, and it follows that a gas of 650 B. T. U. per cubic foot must always develop 650 B. T. U. per cubic foot, if it is completely burned, regardless of the kind of burner. By "completely burned" is meant that all the carbon shall be oxidized to carbon dioxide and all the hydrogen to water.

In the open flame, combustion takes place at the surface, and it is believed that the cause of the light is the glowing of the carbon at the instant of dissociation from its compounds, the hydro-carbons. In the Bunsen burner, the gas acts as an ejector, bringing forward just the amount of air for perfect combustion, so that the flame is non-luminous, and has high local temperatures, on account of a maximum of energy in a minimum of space. In a recent burner, the Méker, the mixture of gas and air is so nicely proportioned that the coolest part of the flame is hotter than the hottest part of the Bunsen, the Bunsen ranging from 572° to 2,840° F., the Méker from 2,930° to 3,227° F.

To arrive at the heating value of a gas, many methods are employed. In the first place it is obvious that from a gas analysis showing the per cent of the different combustible components, the B. T. U. may be calculated by multiplying each component by its heating value, and dividing the sum by 100. Another method is to use a calorimeter. The Junkers calorimeter is one that is used very widely. This instrument is nothing but a refined water heater with means of measuring the gas, the water, and the rise in temperature. The gas burns in a Bunsen burner in an open combustion chamber. The heated gases of combustion rise and then pass down through thin copper tubes which are surrounded by the water on its way through the calorimeter.

After the gas has been burning for a little while, the temperature conditions become tolerably constant. For example, the in-going water remains steady at 60° F. while the outgoing water is, say, 92.5°, a difference of 32.5°. Suppose, now, we collect exactly 2 pounds of this heated water, noting exactly the amount of gas that is consumed while that is done. Say that this is 0.1 cubic foot of gas; 0.1 cubic foot of gas has raised the temperature of 2 pounds of water 32.5°; 1 cubic foot would raise 2 pounds 325°, or 1 cubic foot would raise 1 pound 650°; or the gas has a heat of combustion of 650 B. T. U. per cubic foot.

Another method of determining heat units depends on the fact that the amount of air required for perfect combustion increases regularly with the heat units of the gas. If a cubic foot of any combustible gas is mixed with just the amount of air necessary for its perfect combustion, each cubic foot of such mixture will contain about 100 B. T. U. It is a simple matter to explode a unit of gas with an excess of air and then to determine the excess. Suppose it was found that one unit of gas required five units of air, such gas would then contain $1+5=6\times 100=600$ B. T. U. per cubic foot.

The following analysis may serve as a type of our mixed oil and carburetted water gas:

Carbon Dioxide	3.0%
Hydrocarbon	8.0
Oxygen	.02
Carbon Monoxide	10.0
Hydrogen	45.0
Methane	28.0
Nitrogen	5.8

B. T. U., 650 per cu. ft. Candle power, 20.0

In recent years there have been many attempts to point out a relation between heat units and candle-power. The mere fact, however, that by simply mixing air with gas we can reduce the candle-power to practically nothing, while the heat units are diminished only by the percentage of dilution, shows the absurdity of any such attempt.

Crude oil gas mixed with the carburetted water gas from the residual carbon is a gas of high heating value and high candle power. The open flame is large when compared with that of the old carburetted water gas. The gas is low in carbon monoxide, lessening danger of death by inhalation.

The following from the "Marysville Appeal," September 9th, is self explanatory:

Best Scheme Ever Been Devised

All the leading merchants of Marysville are heartily in favor of the new scheme of electric illumination of D Street. Mayor Hall said yesterday: "It is a good idea and should have received attention long ago." When asked if he thought it would prove successful he said: "There is no question about that. Everybody is willing to support it and it is only a question of a few weeks when work will be commenced upon putting up the arches."

County Surveyor Crook said he thought it one of the best schemes of making Marysville progressive he has seen. Mr. Crook thinks that those who have suggested such an improvement are worthy of a great deal of praise.

Many of the other citizens of Marysville were interviewed and their opinions were much the same as Mr. Hall and Mr. Crook's. They all said they hoped that the arches would be installed as quickly as possible as the money is raised. All of them seemed to be willing to give their best support and would be only too glad to assist in some way toward making the light proposition a great success.

The committee has not yet started on its canvass of the city. It has, however, a list of one hundred and sixty names on D Street whom it will see. Then other sections of the town will be canvassed. While the lights are to be located on D Street there is no reason why it should be looked upon as a purely local measure. All the city is interested in the scheme, all the city should contribute. There should be no difficulty in raising the small sum of money required, and it is hoped that one week's work will see the amount required —$4,000—raised.

The above shows the results of earnest, conscientious and persistent effort on the part of Mr. J. E. Poingdestre, Manager of Marysville District. The idea when first advanced was probably considered a large one for the moderately small city, but there can be no mistake in the assertion that what brilliant, scientific illumination has done for large cities in attracting the crowds to certain districts, can also be accomplished on a proportionate scale in smaller cities.

There is no reason in the world why "D" Street or any other street in Marysville should not be marked as a great "White Way", nor why people should not turn out at night in Marysville in the same proportion to its population as they do elsewhere.

Mr. Poingdestre is heartily congratulated upon the successful outcome of his promoting this enterprise, and we feel assured that Marysville will find it a paying innovation.

R. J. C.

Publicity as Viewed by B. S. Josselyn, President, Portland Railway Light and Power Company

From *Portland Carman*, August, 1911.

THE following account of the remarks made by the president of the company was prepared from notes taken at a recent luncheon given to the heads of all departments. No pretense is made that it is a verbatim report. The thought, however is along the lines which were expressed during the brief moments of the talk. So impressive were they upon those who listened that many requested that they be put in some permanent form, so that others could realize the benefit of them.

"My theory of publicity," said President Josselyn, "in connection with the company, is that it rests with every man in its employment to perform a very important function. The acts of all, whether he be a trainman, a lineman, or connected with the general offices, are held by the public to be the acts of the company. I mean that whatever you do or whatever you may say, the general run of the people seem to regard it as the official act of the company itself. I am not ready to analyze to you just why this should be so, but I am ready to say that in a measure it is very true.

"If we accept this as a basis, then it certainly is the duty of every member of the company's large family to act strictly in accord with the duties of the actual owner and representative of the company. In other words, you must do those things which you would do if you were the mind which directed the operations of the company. Do not construe my meaning with reference to the issuance of certain orders for the operation of the company, but rather as to your conduct as a gentlemen, the ethical side of your nature, as it were.

"You should always be a man of honor. In your connection with the public, you must treat it with the utmost consideration as to its rights and as to its privileges. No greater feat could be accomplished than securing the united coöperation of the honorable conduct of every employee of this company. Right in this line lies the future of our success, in a measure. When you walk down the street, or if you are on the car, or if you are in the home of some friend, good words for the good deeds of the company will go a long way towards popularizing with what too frequently is an unpopular institution in this country, namely, the street-car corporation.

"We are engaged in a really wonderful task,—one of the most important in this enlightened and cosmopolitan age, and that is the proper distribution of the people through the means of transportation. What greater task can be placed in the hands of any set of men than to be trusted with the lives of hundreds of thousands of men and women daily in carrying them from their homes to their places of business. The task is tremendous, and the trust most wonderful. In the performance of this work it devolves upon all of us to do our duty to the utmost.

"For these reasons I believe that every one of us, when we go out into the public and meet our friends and our new acquaintances, should be free to explain to them how earnestly and sincerely we are endeavoring to do this to the best of our ability.

"In this rapidly growing age, where man seems to be ever alert as to his rights and privileges, he has discovered that there is a happy medium and a common plane on which all can meet. It is a sort of 'give-and-take' platform, and most men are willing to concede your rights if they are presented to them in a truthful, fair, and impartial manner.

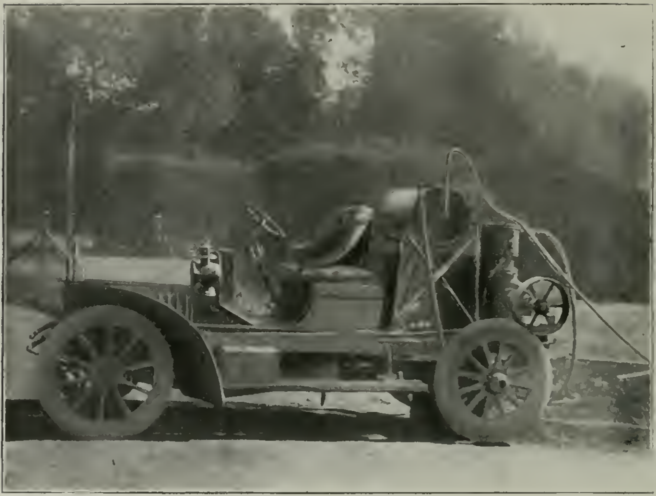
"The publicity which you can put forth to the best advantage is the publicity of an honorable conduct. You are primarily engaged in selling street-car tickets and electric lights. You may be pouring over the books of your office, or you may be engaged in figuring out to your satisfaction the various fractions involved in creating a power factor, yet in an indirect way you are selling the product of this company. Therefore, your attitude towards every man you meet marks to a degree the success with which we sell our goods,—in other words, your public appearance, your smiles, and your cheerful words are important factors in the disposal of our service.

"I will conclude with this advice: give every man a cheerful greeting. Tell all that we aim to please, and act within the rights granted to us under our charter, and that our chief aim is to serve the people. If you do, you will plant the seeds of good will, which will bear an abundant harvest for yourself and for the company as well."

Units of Measure

By FRANCIS E. WILKINSON, Electric Distribution Department.

1 U. S. Gal. Water weighs 8,345 lbs.
1,000,000 Gal. per day=154,723 sec. ft.
1 cent per 1,000 Gal.=3,367 dollars per acre foot.
1 Old California Miner's Inch= 1,728 cu. ft. per day or 1/50 sec. ft.
= 12,925 gals. per day or 538.5 gals. per hour or
=630,720 cu. ft. per year or
= 14,478 acre ft. per year.
1 New California Miner's Inch=$1\frac{1}{2}$ cu. ft. per minute=1/40 sec. ft.
1 Colorado Miner's Inch=2,250 cu. ft. per day or 17,000 gals. (approx.)
1 Second foot=50 Old California Miner's inches or 40 New.
1 Second foot=38.4 Colorado Miner's inches.
1 Second foot=450 Gals. per minute or 723.92 acre feet per year.
1 Second foot=1.983471 acre feet in 24 hours.
1 Second foot=$59\frac{1}{2}$ acre feet in 30 days.
1 Second foot=646,315 gal. per day.
1 Second foot per year=13.57 inches in depth per square mile.
1 Acre foot=25.2 California Miner's inches in 24 hours Old.
1 Acre foot=20.2 California Miner's inches in 24 hours New.
2 Acre feet in 30 days=continuous flow of $.03\frac{1}{3}$ sec. ft.
1 Acre foot=43,560 cu. ft.=325,851 U. S. Gals.
1 Cubic foot=7.4805 gals.
1 Cubic foot of water weighs 62.355 lbs. at 62°.
1,000,000 cubic feet=23 acre ft. (approx.)
1 bbl. crude oil=42 gals.
1 bbl. crude oil weighs 340.6 lbs. for 14 gravity. (Usually taken at 341 lbs.)
1 gal. crude oil weighs 341/42=8.12 lbs.
Pressure per sq. in. for each ft. of head=.433 lbs.
Pressure in lbs. per sq. in. × 2.31=head in feet.
Grains per Gal. × 1.71=parts per 100,000 of solids.
1 Horse-power=1 Sec. ft. of water falling 8.8 ft.
Net Horsepower at wheel=(Sec. ft. of water × fall in ft.) ÷ 11.
Weir Discharge in Sec. ft. $\frac{0.4L_1\ H_3}{60}$ in which L = length of weir in ins. and H = head in ins.



Auto Compressor

For Testing High Pressure Gas Mains

By W. H. FOSTER, Manager, Marin District.

W. H. Foster

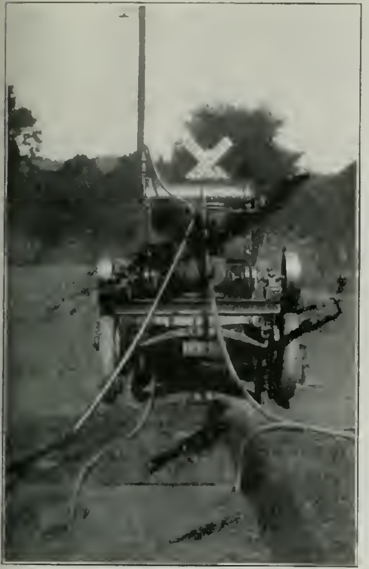
For the purpose of testing high-pressure gas mains in the Marin District, an old automobile was utilized as illustrated. A Gardner-Rix compressor was mounted on eyebeams on the rear end of the auto frame. The shaft of the compressor was extended by couplings, after removal of the flywheel, and pulleys were keyed to each end of the shaft.

Additional cooling was provided by a thirty-gallon tank set at a level higher than any part to be cooled, the course of water from this tank being as follows: tank to top of radiator, through radiator to pump, pump to engine, engine to compressor, compressor to tank.

The speed of the auto was assumed as being twenty miles per hour as a minimum when in high gear, this driving rear wheels at approximately 195 revolutions per minute. Pulleys were selected to give the compressor a speed of 450 at the above driving speed.

The method of operating is to block up the rear axle so that the rear wheels are clear of the ground. The holding-down bolts of the compressor frame are slackened and the entire frame is slid forward until the pulleys are firmly in contact with the rear tires.

The holding-down bolts are then tightened, and to prevent vibration a U-bolt is set down between the frame and the rear axle to prevent vibration and any slippage which might be caused by spring action. The auto is



then operated exactly as when running on the road.

Where available, a small stream of cold water is supplied to the circulating tank to assist in cooling the engine and compressor.

Notice

Employees of the Company are kindly requested that when they forward clippings for reproduction in the Company magazine, to note on such clippings, or attach a slip, giving the following information:

Name of paper clipping is taken from, and date of issue of such paper.

Unless this information is supplied, we cannot use the clipping. R. J. C.

The best way to kill time is to work it to death.

Approximations Used With the Wire Table

If the following data relative to copper wire be remembered, it is simple to deduce the approximate weight, resistance per thousand feet, or area in circular mils of any size.

No. 10 wire (bare) weighs 32 pounds per thousand feet, has a resistance of 1 ohm per thousand feet, and has an area of 10,000 circular mils (approximately).

No. 5 wire (bare) weighs 100 pounds per thousand feet (approximately).

Starting with a wire size of known weight and resistance, the relative weight of sizes larger and the relative resistance of sizes smaller will increase with the following factors, viz.: 1, 1.25, 1.60, 2.

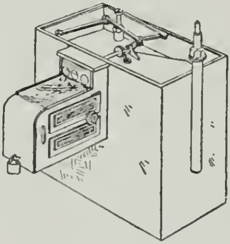
A wire three sizes larger than another wire has twice the weight and area in circular mils and one-half the resistance; likewise, a wire three sizes smaller than another wire has one-half the weight and area and twice the resistance.

The number of feet per ohm equals circular mils divided by ten.

The number of pounds per thousand feet equals circular mils multiplied by 3 and divided by 1,000.

C. J. Wilson.

BILL-DELIVERY MECHANISM FOR GAS METERS—A meter designed to present you with the bill for the amount consumed during the month is shown in Fig. 11. It is a combination, with meter gearing, of a recording wheel, a gear wheel for intermittently advancing the recording wheel, and means for moving the recording wheel bodily to take a record therefrom.



Towing Locomotives

Method of Towing Ships Through Locks—Bids for Locomotives

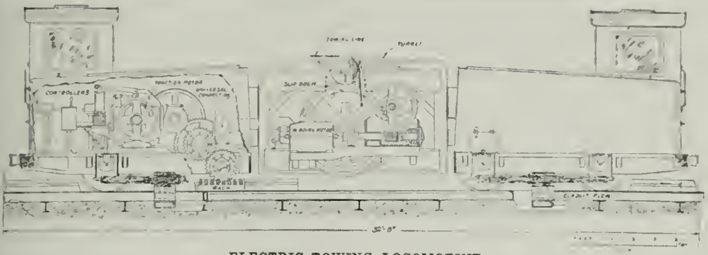
From *The Canal Record*, Ancon, Sept. 27, 1911.

Specifications and plans for the locomotives which will tow ships through the locks have been sent to the Washington office, in order that bids may be asked for the forty locomotives that will be required for the locks at Gatun, Pedro Miguel, and Miraflores. The system of towing outlined in the specifications is the invention of Edward Schildhauer of the Canal engineering staff, and patent has been applied for, the Government having the right to use the patent without renumeration. Two bids will be called for, one for one locomotive for test purposes, and the other for the remaining 39, in case the first is satisfactory.

The system of towing provides for the passing through the locks of a ship at the rate of two miles an hour, the vessel being held steady between four lines of taut hawsers. A ship will come to a full stop in the forebay of the locks, where four hawsers will be attached to it, two forward on either side and two aft. At their other ends, these hawsers will be attached to the windlasses of four towing locomotives operating on the lock walls, two forward towing, and two aft being towed by their hawsers, thus holding the ship steady. The locomotive will run on a level, excepting where they pass from one lock to another, where they will climb heavy grades. Between the lower and intermediate locks at Gatun, for example, there is a difference in elevation of 29 feet 7 inches, and, in order to save concrete, this ascent is made in the shortest feasible distance. The horizontal distance from the point of tangency on the lower lock wall to the point of contact on the wall of the intermediate lock is 106½ feet. The vertical curve has a radius of 100 feet, and the maximum grade is one on two.

There will be two systems of tracks, one for towing, and the other for the return of the locomotives when not towing. The only crossovers between the tracks will be at each end of the locks, and there will be no switches in the rack road. The tracks will be of the 5-foot, Panama railroad gage, laid with 90-pound Bessemer steel rail on Carnegie steel ties, each tie anchored into the concrete by a bolt on the side farthest from the lock chamber. On the center wall there will be two towing tracks with one return track between them, and on each side wall a towing and return track. The towing tracks will have a center rack throughout, and the locomotive, while towing, will always operate on this rack. On the return tracks, at the incline between locks they will also operate on racks, but elsewhere they will run by friction. The racks will be of cast steel, so formed that lubricant will not drop upon the concrete, and that water will not be held in the interstices, this latter precaution being taken against the breeding of mosquitoes. The distance from center to center of adjoining teeth is 3.13 inches. After hauling the ship through the last gates, and into the forebay, the locomotives will coil their cables and return to await another ship, or will take hold a vessel going in the opposite direction, and tow it through.

Each locomotive will consist of three parts, as shown by the drawings reproduced on this page—two tractors, and between them, a windlass. The windlass will not be mounted upon a truck, but will be supported by two arms extending on each side from either end and resting on bearings immediately over the rear wheels of the tractors. The ends of these arms will be equipped with rollers to



ELECTRIC TOWING LOCOMOTIVE

Side View: One tractor showing housing, one tractor and the windlass unit without housing, showing the machinery with certain parts omitted to depict the more clearly the working features.

permit free horizontal movement of the members when the locomotive is rounding a horizontal curve. The windlass is joined to the tractors by a drawbar and trunnion which have the effect of a universal joint, and permit free movement of the parts when the locomotive is on a vertical curve.

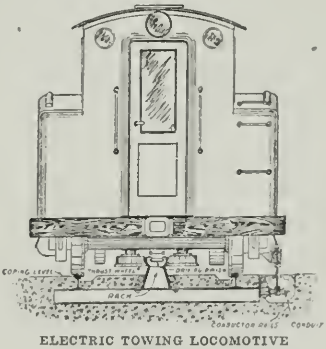
TRACTORS.

The tractors will be alike in every particular, each consisting of a four-wheel truck upon which are mounted a motor and a control apparatus. They will run as rack or friction locomotives at the will of the operator, and the whole locomotive can be controlled from either cab.

While towing, and on the inclines between the locks, the tractor will run as a rack locomotive. Motion is communicated from the motor to the rack pinions by means of a system of gear reduction in which there are no clutches. There is absolutely no means of disconnecting this train of gears, and, as a result, the rack pinions are in motion only when the motors are. A solenoid brake, which closes upon a brake wheel whenever the current is cut off from the motors, provides against accident in case the current should be cut off while the locomotive is on one of the inclines. In such an event, the locomotive would come to a stop instantly, and be held there until the brake should be released. The rack pinions are of quill construction, and are so mounted upon the back axle of each truck, that the rack pinion will run free from the motor when the locomotive is on the return track, and traveling by friction.

For traveling by friction, the tractors will be fitted with jaw clutches, which will connect the traction motors with the driving wheels. These clutches will be operated by solenoids. The locomotive, when operating by friction, will move at a rate of five miles an hour.

The electrical equipment for each tractor will consist of one traction motor with control apparatus. The motor will have a full speed torque of 840 pounds at one foot radius, full load speed at no less than 470 revolutions per minute, and will be capable of developing not less than 75 per cent greater torque for a



ELECTRIC TOWING LOCOMOTIVE

End View: Showing rail system with rack rail in center and power rail on side in open conduit period of one minute. Alternating current will be used with the effect that synchronous speed will be maintained on all the locomotives in a tow. The motor will be 3-phase, induction, totally inclosed, moisture proof, high torque, or mill type, 25 cycles per second, with 220 volts between lines. The motors on the tractors of each locomotive will be operated in parallel, and controlled by resistance in the secondary circuit, accomplished by contractors in the primary and secondary circuits operated by master controllers, one in each cab. There will be not less than seven power points in each direction and between these and the braking position, there will be a coasting point, so that when power is turned off from either forward or reverse direction, there will be available a coasting point before the braking position is reached. The master controllers will be of the drum type, one for each tractor.

Current will be collected by each tractor by means of a plow carrying two contact shoes, each operating on a separate power rail carried in an open conduit, one for each of two phases, while the third phase will be carried by both track rails. The maximum load that will be thrown upon the traction motors will occur when the locomotive is ascending the inclines between the locks, and this will be greater than the load of towing a ship. Inasmuch as weight is not required for tractive effort, the whole locomotive will be of light construction as possible, the estimated weight being 70,000 pounds.

WINDLASS.

The third part of the locomotive will be a windlass for hauling in or paying out the towline, and motors to drive it. The drum will be 18 inches in diameter. A friction clutch will provide against it ever sustaining a pull of more than 25,000 pounds. Two speeds are provided for, one for coiling in the line under load at a rate of ten feet a minute, and the other for coiling it when not under load, at a rate of 200 feet per minute. Rotary switches in the cabs of each tractor will control the movement of the windlass.

There will be two motors, one for operating the windlass under load, and one for the rapid coiling of the hawser. The windlass motor will have a full speed torque of 120 pounds at one foot radius, will be capable of fifty per cent greater torque for one minute, and will have a full load speed of not less than 630 revolutions per minute. The coiling motor will have thirty pounds torque at one foot radius, be capable of exerting fifty per cent greater torque for one minute, and will have a full load speed of 630 revolutions per minute. These motors will be of the squirrel cage type, otherwise the same classification as the motors in the tractors.

The towing line will pass through a sheave in a revolving turret, which will permit it to rotate easily in a horizontal plane, so that the line load may always be directly on the guiding sheave. The tow line will be of plow steel wire, composed of six strands of 37 wires each, will have a hemp center, and will be one-inch in diameter. The wires must have a tensile strength of not less than 225,000 pounds per square inch, and the hawser must have an ultimate breaking strength of not less than 70,000 pounds. There will be a 4-foot loop at the ship end, and the length of the line from the center of this loop to the drum of the windlass will be 215 feet.

All the machinery, for both windlass and tractors, will be housed in a steel casing. The housing of the windlass will consist of a steel frame covered with $\frac{3}{16}$-inch steel plate. The top sheeting must be capable of standing a strain of 85 pounds per square foot, and the upper side edges of the housing must be capable of sustaining a concentrated load of 12,000 pounds, which may be placed upon it when the tow line is used to warp a vessel up to the lock wall, and the line is at right angles to the locomotive, and the chock of the ship is considerably below the locomotive.

"Corporations Have Rights"

THERE is a Public-Service Commission in Los Angeles. It has power to investigate and report upon the rates to be charged by telephone, telegraph, gas, power and other quasi public corporations, but not to fix rates. Such authority rests entirely in the City Council.

Some time ago the Commission was called upon to investigate the rates charged by the Sunset and Home Telephone Companies. It found that the Home Company's rates were maintained at a very low figure in order to get business and that the Sunset Company could not give the same rates and earn a reasonable income on its investment. It recommended to the City Council that the Sunset Company's rates be not lowered and filed the reports of a number of experts to show that its recommendation was right.

The City Council didn't accept the recommendation, but instead arbitrarily reduced the rates of the Sunset Company to meet those of the Home Company. The matter was taken into the United States District Court in Los Angeles and the City Council reversed. The Court held with the Commission that the rate did not give the Sunset Company a fair income on its investment. In fact the Court couldn't do anything else. The City Council's own expert had to admit in Court that the proposed reduced rate was too low. His services cost the taxpayers $8,000 and left the City without any case. Some $40,000 in so-called excess rates which had been impounded by the Court was turned over to the company.

In the meantime the Home Company asked to raise its rates. The Commission advised that it be permitted to do so, but the City Council refused its consent. All the experts are with the Commission and no doubt in due time the Courts will again reverse the City Council.

"The Outlook's" article is so sane and so timely that it is worth repeating in full. It is entitled "Corporations Have Rights," and is as follows:

"The final ruling of Judge Wellborn in the United States Circuit Court, restraining the City of Los Angeles from enforcing a lower rate for the Sunset Telephone, serves to emphasize an unfortunate mistake by the City Council of that city over a year ago and repeated recently.

"In May, 1910, the Council undertook to reduce the Sunset rate, making it equal to the Home, although the report of the City Utilities Commission, based on the findings of experts, called for an increase in the Home rate to meet the Sunset. The latter company took the matter into court and a temporary restraining order was granted and the money representing the difference between the old rate and the proposed new rate was impounded, to be returned to rate payers if the company should lose the suit. An investigation by experts was ordered by the court, to determine whether the proposed rate was confiscatory, as claimed by the Sunset people.

"In the meantime, Council provided an expert to make an investigation in the people's behalf, which was in effect a repitition of the work done by the Utilities Board whose report had been ignored. This expert presently brought in the same decision, viz., that the proposed rate was confiscatory. The work cost $8,000, and left the city hung up without any case. No further contest was attempted; the court ruled against the city, and the $40,000 which had been collected was held by the company.

"Nevertheless, in the face of the certainty of this decision on the Sunset case, the Council refused to allow an advance in the Home rate. There again it went against the decision of the Utilities Board.

"The attitude of the present Council toward the Utilities Board has been totally out of line with any possible theory of intelligent good government. The last Council of Los Angeles did everything in its power to prevent the city from having an effective Utilities Board, and this Council seems to be doing all it can to make the Board utterly useless. When men serve the city gratuitously and do a great amount of painstaking and time-consuming work, they will not submit with composure to their labors being rudely cast aside and then see a running-jump decision made on important matters exactly contrary to their advice. Decent people will stand very little of that, and yet it is just the treatment that this Council seems to think the proper thing for a Utilities Board.

"The story is an old one. The whole trouble is a lack of nerve on the part of the Councilmen. The Utilities Board takes a stand based on justice and exact facts as obtained by skilled experts. Knowing that the companies have recourse to the courts, they have sense enough to know that any rate fixing that is not based on justice cannot stand. The Council understands that, too, but when an angry and noisy delegation appears in the Chamber and demands relief from 'corporate aggression,' the Council is much impressed, and forgets all about the great general public that wants justice done, even to a corporation, but that never goes up to the City Hall to express its views.

"The present Council of Los Angeles has a great deal set down to its credit, and it is a source of profound regret to its friends that it should have been led out of its true course in this matter. The people desire that utility corporations should be controlled and regulated, but they would have it done with justice and intelligence, not bullheadedly and unfairly. The ultimate result of the system of the Council as thus far developed will be to destroy all effectiveness in city control and compel us to replace it by control under State authority."

* * *

The new two-story residence recently constructed in San Rafael by Mr. Walter H. Foster, Manager, Marin District

The Employee—The Position—The Employer

By C. T. FERGUSON, Foreman, Santa Rosa District.

IN this big busy world of ours, it is necessary that all great undertakings must have a great many competent men to perform the various duties connected therewith, and they should be a unit of the whole. The capitalist can't execute his great schemes without the aid of engineers, and they in turn must rely on the laborer to perform the manual work. As a part of the whole, the employee should perform his task so as to merit the commendation of his employer, and just as he hopes for advancement, just so well should he perform his various duties. Don't slight your duty because you think the salary is out of proportion to the work required, for you never can hope for advancement if you do not fulfill all the requirements of your present position. If your duties are always well done, the eyes of your employer will be on you, and when he realizes that you are a better man than your present position, he is untrue to his own best interest if he doesn't recognize your ability and advance you to the position your ability justly entitles you.

You may think your salary isn't a just recompense for the work done, and may have a tendency to balance the two, by giving an inferior service, and just so far as you do, you are untrue to your own best interests, for an inferior position poorly filled is a sure sign that a better one will be likewise.

The employee who thinks more of hearing the five o'clock whistle than the one at eight will remain in his present position until it is finally too big for him, and he will drift with the tide of humanity, and finally end below where he began. On the other hand, the one who, to use a street phrase, "Is Johnny on the spot," will advance with the tide, and not recede. He is always trying to do his work a little better than some one else, and in due time he will reap his reward.

As we all will pass this way but once, ever remember that true merit will finally win its just reward, and that a kind, sympathetic word to the struggling one doesn't cost a cent, and may be a great help in time of need.

Remember that in this busy age and day that there isn't any place for the man who lives for himself alone.

In closing I would quote as a motto for us all:

> The thing that goes the farthest,
> Toward making life worth while,
> That costs the least, and does the most,
> Is just a pleasant smile;
> It's full of worth and goodness too,
> With many a kindness blent,
> It's worth a million dollars,
> And it doesn't cost a cent.

Notice

We beg to call the attention of employees to the fact that when sending in photographs, illustrating articles written for the Company magazine, kindly do not do any printing on the face of such photographs, as these photographs are used in making halftones, imprints from which appear in the magazine, and any numbers or remarks on the face of the photographs have to be eliminated through art work, which is expensive, or else appear in the halftones.

Kindly make remarks in lead pencil on back of the prints. R. J. C.

The following notification to remove a meter was recently received by the Fresno District Office:

"His house was stop He no use that Gas Please you take off the Gas Mett for him If you see him He give a key you go to ChinaAlley."

What the Press Has to Say

Gas and Electric Company to Have Display Room

The business office of the Pacific Gas and Electric Company on D Street will be removed in a few days to the vacant room in the Ellis block, next to the office of the Globe Express. The room that is now used by the company will be given over to the displaying of stoves and gas and electric fixtures. This move will give the company an excellent opportunity to display their stock, which is quite large, and will also give the office force more room in their new quarters. The office equipment will be up to date and arranged for the comfort and convenience of the force. Private offices will be established for Manager Poindestre, and in every way the new arrangements will be superior to the old. During the past year the business of the company in Marysville has grown to such an extent that the move and addition of floor space was absolutely necessary. The new rooms will be brilliantly lighted, and workmen commenced this morning to put the room into shape.

Marysville Democrat, Oct. 31, 1911.

Electric Lighting System for Patterson

Pacific Gas and Electric Company Preparing to Furnish Additional Lighting Facilities

Additional lighting facilites will soon be furnished the residents of Patterson.

W. A. Widenmann, manager of the Stanislaus District, with headquarters at Newman, and B. M. Levy, of San Francisco, both representatives of the Pacific Gas and Electric Company, arrived in town Monday and immediately began the work of signing up contracts with Patterson residents for electric light and power service. Mr. Widenmann returned to Newman Monday evening, but Mr. Levy remained to take contracts.

In speaking of the contract which the company is having signed up, Mr. Widenmann stated that it was merely to show the intention of the party signing to use juice. The contract seems to have met with the approval of the business houses here, as most of them signed up at once.

The rate under which the Pacific Gas and Electric Company will furnish lighting for residence is nine cents per kilowatt-hour, with a minimum charge of $1.00. The rates for business houses will be from three to eight cents per kilowatt-hour, with a minimum charge of $1.00. These rates compare very favorably with rates in other valley towns.

A great many of the business houses and residences here are already wired for lights, and the people have been anxiously waiting for the electric company to furnish them with power. The work of establishing the lighting system will probably be begun as soon as the company gets the material on the ground.

Patterson Irrigator, Nov. 2. 1911.

Talking about public-service corporations and the attitude of their management and employees toward the public, Stockton has one corporation manager who is a wonder. He is Mr. Hall of the water company. You seldom hear of any friction between the water company and the officials or people. Hall has a way of attending quietly to his business. He fights shy of trouble. His success as a manager is easily explained. In the first place, he is selling water, and he makes it a point to confine his activity to that. He sells good water and does not let the old well run dry. Other cities have water famines, Stockton never. Again, Hall is suave and pleasant personally. He never has to pass the buck.

Stockton Mail.

New Gas Mains to be Laid Along Belmont

Work Undertaken Under Belief Avenue Will Be Paved

The old gas mains on Belmont Avenue from Forthcamp to Valeria Street are to be torn up and replaced with new ones.

Announcement of the intention to perform this work, which will be started the first of next week, was made today by W. N. Henderson, local manager of the Pacific Gas and Electric Company. Mr. Henderson also states that an appropriation has been made for the replacing of the old mains on K Street from Stanislaus to Van Ness Avenue, and that this work will be undertaken within the next two weeks.

"Our company will replace the old mains along Belmont," stated Mr. Henderson, "because we figure that the avenue will soon be paved and that it will be cheaper to do the work now than it will be to wait until the pavement is laid. It is cheaper to dig up dirt than asphalt.

"We know, of course, that there is some work of improvement now in progress along Belmont. But we believe that the people will be better satisfied if we undertake the replacing of the mains now than if we should wait until the permanent pavement is laid."

Fresno Herold, Nov. 1, 1911.

Gas Company Has Received Medal From Apple Show

From *Sebastopol Times*, Oct. 21, 1911.

MANAGER MAITLAND G. HALL, of the Santa Rosa Branch of the Pacific Gas and Electric Company, has received the handsome gold medal awarded his company for the display made at the annual Gravenstein Apple Show in Sebastopol last August. The medal is a very fine piece of workmanship and is highly appreciated by Mr. Hall and the employees of the local branch of the corporation. It was forwarded to President John A. Britton Thursday afternoon.

The face of the medal carries a branch of an apple tree with two large apples suspended therefrom with the embossed wording around the edge, "Gravenstein Apple Show Association."

The reverse side has a small wreath made of apple tree branches carrying a number of apples around the upper edge, while in the center are the words: "Awarded at Sebastopol, Sonoma County, Cal., to Pacific Gas and Electric Co., for most artistic exhibit in Implements, 1911."

Wreck of the U. S. S. "Yosemite"

By E. M. MILES, Collector, San Francisco Gas and Electric Company.

AMONG other memorable events in my career as a man-of-war's-man in the United States Navy, the writer was stationed aboard the U. S. S. "Yosemite" at Guam on November 13th, 1900, when that ill-fated vessel was caught in a typhoon which swept this little island of Uncle Sam's in mid-Pacific, and drove our ship ashore in spite of good anchorage. Both anchors and chains were lost in the face of this hurricane, blowing over a hundred miles an hour, which lashed the sea into a mass of white seething foam and caused the ship to pound heavily on the dangerous coral bed of treacherous Guam harbor. A boat manned with a crew of about ten or twelve men was lowered in an attempt to carry a hawser ashore to make fast to a tree to prevent the ship from swinging. It was, however, vain in such a sea. Several oars were wrenched from the men's hands, the hawser was swept aft and lost, and the boat's crew barely managed to get ashore with their lives. One of the men, the boatswain, suffered a broken arm. To add to our apprehensions, the "Yosemite" was found to be leaking badly through a hole in the bow. The wind soon veered and swung her clear off the bottom and out to sea. Our doom seemed sealed, as the ship had lost both rudder and propeller, but under the direction of our commanding officer we centered all our efforts towards keeping her afloat. Would the watertight bulkheads hold? That was the thought ever present in our minds, as we were in a sinking condition and the bow was almost submerged, causing the stern to rise high out of the stormy sea. Fortunately for us, they did, and by dint of hard, desperate work we managed to keep her afloat that fearful night, during which thoughts of "Home, sweet home" were uppermost in the minds of the boys in blue. Morning dawned, the hurricane gradually spent its force, but our plight was desperate indeed as the ship was found to be half full of water, unmanageable, nearly all our boats smashed, and drifting about 120 miles from shore in a rough sea which threatened to engulf us every moment. However, the fates were kind to us as the current was found to be setting toward the shore. It gradually carried us in to a point about thirty miles off shore, but with rudder and propeller gone we were unable to turn the ship toward the island. As the crew of 180 men had worked desperately all night and the preceding day as well without anything to eat, as the ship's stores were under water, we were completely exhausted. However, investigation disclosed the fact that some of the officers' stores were not under water, and the ship's cook soon had hot coffee and hot soup ready to be served, which together with hard tack, braced us up not a little. The forenoon passed without any change, but fortune smiled upon us that afternoon. The Collier "Justin" had weathered the storm in the harbor and put out to sea to search for us. After signalling her she came to our aid and attempted to tow us ashore, but the "Yosemite," being full of water proved unmanageable, and after several attempts the "Justin" was forced to give it up. We were soon transferred to the collier, abandoned the old station ship "Yosemite" to her fate, and she gradually sank to the bottom of the sea. Upon landing at the island the next morning we found a surprised and joyous welcome awaiting us from the officers and men ashore, none of whom had expected to see us again.

Authorized Additions and Improvements

CONTRA COSTA DISTRICT: Work on reconstruction of distribution system in Benecia and installation of a new series tungsten lighting system.

FRESNO DISTRICT: Work on installation of washer, known as the ammonia type, between the relief holder and purifier.

A 16-inch Connelley governor and No. 10 booster operated by 25-horsepower engine.

Work has been commenced on extension of high-pressure main to Kearny Boulevard Heights.

MARIN DISTRICT: A one-story building with brick vault has been constructed for use as office for superintendent and drafting room.

A gasoline wagon for use in Marin District.

NEVADA POWER DIVISION: An additional bank of three 300-kilowatt transformers in the Grass Valley substation.

NORTH TOWER POWER DIVISION: A No. 30 E. M. F. automobile has been purchased for use in this district.

OAKLAND DISTRICT: Gas mains in the town of Richmond for the purpose of connecting up one hundred additional consumers.

PETALUMA DISTRICT: Three-phase line will be extended to Penn Grove and outlying districts for the purpose of furnishing light and power.

REDWOOD DISTRICT: Three-phase primary line to the Hooper tract at Redwood City for the purpose of supplying power for rock crusher and lighting service.

Street lighting system for the Menlo Highway Lighting District.

Nineteen additional street lights in Burlingame Park.

SACRAMENTO POWER DIVISION: New switchboard and busses at Broderick substation.

Contsruction of 2.7 miles of 60,000-volt lines, and installation of three 125-kilowatt transformers, for the purpose of furnishing service to the Mountain Quarry Company near Auburn.

The Natoma substation, which was destroyed by fire on August 18th, has been rebuilt and is again in service.

Work has been commenced on the reconstruction of the Davis switching station, with the installation of latest type of oil and air switches.

SAN FRANCISCO: An additional runabout automobile for use in case of emergency.

Installation of lampblack filtering and briquetting plant at Potrero Gas Works.

An additional automobile has been purchased for use of Superintendent of Generating Stations.

Runabout has been purchased for use in Gas Meter and Service Departments.

SAN JOSE DISTRICT: Service along the Monterey Road toward Coyote to furnish power to a number of consumers.

A Connelley governor with No. 10 booster, operated by 50-horsepower motor, at Gas Works.

Installation of reserve exhauster, and also ammonia type washer.

SOLANO POWER DIVISION: Work has been done on construction of 12 miles of 60,000 line, and 10 miles of 10,000-volt line, Reclamation District 108, and also substation and installation of three 300-kilowatt transformers near Knights Landing.

Construction of new substation building at Dixon.

Pacific Gas and Electric Magazine

PUBLISHED IN THE INTEREST OF ALL THE EMPLOYEES
OF THE PACIFIC GAS AND ELECTRIC COMPANY

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The Pacific Gas and Electric Company desires to serve its patrons in the best possible manner. Any consumer not satisfied with his service will confer a favor upon the management by taking the matter up with the district office.

VOL. III NOVEMBER, 1911 NO. 6

EDITORIAL

ELECTRICITY, to an intelligently trained mind, such as possessed by an electrical engineer, is a tangible commodity which may be handled by him without fear, which can be measured, regulated and directed as his will dictates, and appeals to him only as a great blessing bestowed upon mankind. It lessens his burdens, gives him increased powers and energy, and lights his way during the night.

To the ordinary layman, however, electricity is a mysterious substance, which his mind is incapable of grasping, and the cells of his brain wherein imagination is presumed to register impressions, are not sufficiently developed to grasp and retain the knowledge of what constitutes electricity, simply because it is something that the eyes have not actually seen. He has heard of voltages, of amperes, of electric generators, motors and meters. These, however, are mere words, as he does not know their use, and consequently cannot know their worth and value.

To men coming under the first class as above, electricity is harmless. To the second class, however, it is a menace and danger if interfered with.

Such being the case, why is it that a man unversed in the science of electrical engineering will tamper with the electric wiring in his house, when, on the other hand, if a door needed to be rehung, or a faucet or valve was out of order, he would call in a carpenter or a plumber?

Most of the accidents resulting from electric shocks would never occur if the original wiring in houses was allowed to remain as first installed by an electrician. Houses are wired by competent electricians, who understand their business or they would not be allowed to operate. Such wiring is always inspected by the city authorities, and furthermore, by representatives of insurance companies, and if such wiring is left severely alone by occupants of houses, there is not the slightest danger of accidental "shocks," "shorts" or fires from what is known as "crossed wires."

Service wires leading from street lines into houses are amply protected by proper insulation, and the interior house wiring is further protected by fuses, which act as a safety valve in case of trouble. A fuse is a small plug made to screw or insert in a socket. Inside the fuse is a small wire. Enough electricity is allowed to pass through this wire to supply all the lights or power originally intended for the house, but not enough to fuse the wires inside the house and start a fire. If lightning should strike the wires outside the house, or if an overload of electricity should be thrown onto such wires, the fuse, being weaker than such overload, simply burns out within the confines of the receptacle wherein the fuse wires are located, and the house wiring is automatically cut off, and the overload stops at the fuse.

Numerous fires which are charged up against defective wiring are, in a great many instances, due to the insertion by residents of houses, of any handy metallic substance, a piece of copper wire or an old hair-pin, so as to prevent the fuses from blowing out.

People do this in order to avoid annoyances resultant from fuses blowing out, such blowouts being in a great many cases due to their own dangerous carelessness in overloading the house lighting fixtures, by adding thereto different electrical appliances in the way of sad-irons, sewing machine motors, etc., without first notifying the electric company or an electrician to adjust fuses to carry the overload.

Again, many householders, after they have erected a new residence or moved into a new rented house, desire additional electrical devices in the shape of base plugs for heaters, additional lights in differents parts of the house, reading lamps to hang over beds, etc., and instead of calling in a competent mechanic, trained to do such work, they undertake these additions themselves. They have no conception whatever of the necessary gauge of wire to use, nor do they stop to examine such wire to see that the insulation is sufficiently heavy or that it is not damaged, and in many instances, thinly insulated wires have been strung inside walls, on partitions, and along ceilings without any protection whatever. In time the insulation chafes through, gets damp and rots, and then the current shorts, and starts a fire. Wires have been found strung along beams, fastened with ordinary nails, bent over, and in the bending the insulation has been cut away, and numerous other dangerous contrivances which jeopardize homes are often resorted to as a matter of making a temporary minor saving—but which in the end cause the loss of hundreds of thousands of dollars and thousands of homes throughout the United States every year.

An amateur plumber through his own bungling is not even in danger of drowning, and the worst he can do is to flood a house and ruin its contents. A carpenter is also considered harmless, most of the damage being done to himself through his own carelessness, in inflicting cuts and bruises; but a make-shift electrician is dangerous in the extreme, for he knows not what may result from his meddling, and if the resultant troubles could be inflicted upon him alone, he would have earned only his just reward; but his dangerous arm is far-reaching, and in fact is unlimited in the scope of possible damage.

Education along the right lines in regard to electricity, will be the means of saving many lives and an enormous monetary loss each year throughout the land. R. J. C.

Notice to Employees

In accordance with instructions received from the office of the Vice-President and General Manager, the Pacific Gas and Electric Company succeeded to the business of the San Francisco Gas and Electric Company and the Mutual Electric Light Company, as of November 27th, 1911, and hereafter, all business in the territory formerly covered by the San Francisco Gas and Electric Company will be transacted in the name of "Pacific Gas and Electric Company, San Francisco District."

In accordance with similar orders, on and after January 1st, 1912, the Oakland Gas, Light and Heat Company, United Gas and Electric Company, Redwood; United Gas and Electric Company, San Jose; Sacramento Electric, Gas and Railway Company, and Stockton Water Company, will be known as "Oakland," "San Jose," "Sacramento," and "Stockton" Districts, respectively, of the Pacific Gas and Electric Company. R. J. C.

"If we realize that experience is what we need—not necessarily happiness or contentment,—the whole value of life is altered. Sorrow, pain, uncongenial life,—these the hours when we climb.

A. C. Benson.

The Oakland Gas, Light and Heat Company has recently instituted a very excellent idea in getting their solicitors and Commercial Department men together for little experience talks, and the drawing out and advancing of new ideas. That this departure is bearing fruit can be attested to by the following arguments advanced in favor of gas water-heaters.

WHY GET A GAS WATER-HEATER

W. J. ARMSTRONG:

Because! In any modern house, hot water is a necessity. A small or large quantity of water may be obtained in a much shorter time than by any other method, and at much less cost. If circulating boiler is already installed, connections can be made so that the existing coal range need not be disturbed. With a gas water-heater the heat is applied direct to the water only.

P. C. WICKERSHAM:

To produce the same results, we show that it is more economical, more comfortable, more convenient. A small quantity of water can be obtained very quickly. For the bath, a large quantity may be obtained at small cost at any time desired.

F. GILBERT:

Convenience, low cost of operation, cleanliness.

W. A. DONALDSON:

Such an appliance is indispensable. A bath for child or adult may be had in from fifteen to twenty-five minutes; this at any time, day or night, without the necessity of building a big fire. With the automatic types, no boiler is required, the circulating system being directly connected to water heater.

E. J. COLBERT:

I estimate that 40 to 60 per cent would be the saving over coal. As to time required for supplying service, the gas water-heater has the advantages by more than 100 per cent. The arguments that apply to the use of the gas range, viz: time, cleanliness, labor saving and convenience, are applicable here.

J. F. FUGAZZI:

Neatest, quickest and most economical way of heating water.

J. H. SOUTER:

Unnecessary to build a large fire, or to wait a long time for a bath; ready at all times; heat applied direct to water, no heating of kitchen or place where heater is installed.

M. P. BROWN:

Convenience and economy are my strongest talking points.

F. W. FOLSOM:

Saving of time; less cost; cleanliness; the avoidance of handling fuel and dirt.

THEO. ZIEGLER:

No kindling; no waiting for fire to start. When work is done, no ashes to carry away. No faulty chimney to retard or delay the work.

R. O. ADAMS:

Convenience, economy.

GEO. S. MOSS:

Convenience, ready at all times day or night. No item in the household furnishings is more important, or better appreciated.

I. O. NEILSON:

Cleaner, quicker, the element of danger nil. Insurance cheaper than where liquid fuels are used. Labor saving in the matter of handling and storing fuel.

J. CHRYSOSTOMO, JR.:

Cleanliness, economy, quick action. However, for the heating of a small quantity of water, a gas water-heater is not economical.

NOTES.

My personal views on the subject of heating water in small quantities, are that the gas water-heater is not the most economical. Should advise the use of some smaller vessel on top burners where only a few quarts of water is required, such as for the washing of dishes, etc. For the laundry work and bath, where it is necessary to use large quantities of water, the ordinary heater connected to the circulating boiler will be found both convenient and economical.

JOHN CLEMENTS.

WHY GET A GAS RANGE.

GEO. S. MOSS:

Because! Clean, economical, ready at all times especially in case of sickness. Nothing can be more necessary.

F. W. Folsom:

Clean, economical, ready at all times. Economy in time very important; time is money.

W. J. Armstrong:

Clean, economical, ready at all times. Economy in time very important; time is money; handling of other fuel; when through using all expense stops. Regular price for this fuel; no fluctuation during year.

J. A. Zech:

Clean, economical, ready at all times; economy in time, avoid excessive heat on hot days. You can heat the kitchen in winter by opening oven door. (Do not recommend this as an economical thing to do.—Clements.)

Theo. Zeigler:

Can be put in any place. Requires no expensive chimney. All other points as enumerated by others. (If no chimney some vent should be provided.—Clements.)

W. E. Sells:

Rather favorable to a special stove (Domestic) because of its enameled ovens, preventing rust.

R. O. Adams:

Convenience, efficiency, economy.

W. A. Donaldson:

Clean, convenient, efficient, economical. Space required for same important, especially if it relates to storage of wood, coal or any solid or even liquid fuel; no cellar, no bin, woodshed or storehouse necessary.

E. J. Colbert:

Cleanliness, convenience, efficiency, economy. In Richmond gas is sold at $1.25 per thousand cubic feet, coal at $13.00 a ton. To produce the same result at figures given, gas is 40% the cheapest.

J. F. Fugazzi, J. H. Souter,
M. P. Brown, J. Chrysostomo:

Cleanliness, convenience, efficiency, economy.

I. O. Neilson:

Clean, ready at all times, economical, no fuel to carry in, no ashes to carry out. No dirty flues to clean. Insurance rates are not raised when gas is used, when such is the case with gasoline and oil.

F. Gilbert:

Because first cost is less than a coal range, for the same heat units cost is less. All that can be done on a coal range can be done on a gas range, with less care and worry.

P. C. Wickersham:

First cost is less. Results generally better. No heat is wasted uniformity of heat; instant action, and absolute control; a meal can be prepared in less time than it takes to secure and kindle any other kind of stove or range.

Gradatim

Heaven is not reached at a single bound;
But we build the ladder by which we rise
From the lowly earth to the vaulted skies,
And we mount to its summit round by round.

I count this thing to be grandly true,
That a noble deed is a step toward God,
Lifting the soul from the common clod
To a purer air and a broader view.

We rise by the things that are under feet;
By what we have mastered of good and gain;
By the pride deposed and the passion slain,
And the vanquished ills that we hourly meet.

We hope, we resolve, we aspire, we pray,
And we think that we mount the air on wings
Beyond the recall of sensual things,
While out feet still cling to the heavy clay.

Wings for the angels, but feet for men!
We may borrow the wings to find the way—
We may hope and resolve, and aspire and pray;
But our feet must rise, or we fall again.

Only in dreams is a ladder thrown
From the weary earth to the sapphire walls;
But the dream departs and the vision falls,
And the sleeper awakes on his pillow of stone.

Heaven is not reached at a single bound;
But we build the ladder by which we rise
From the lowly earth to the vaulted skies,
And we mount to its summit round by round.

Josiah Gilbert Holland,
in *Washington Star.*

Domestic Science Lessons

By MRS. H. ROSE STEWART

LESSON IV.

Beautiful maiden, pause ere you wed—
Learn to boil coffee, learn to bake bread;
Learn, oh, sweet girl, that one road to man's heart
Lies through his stomach—they are not far apart.
He loves your sweet face, he praises your eyes,
Has a tooth for your puddings, dotes on your pies.
Then, beautiful maidens, be sure, ere you wed,
That you learn to make coffee, learn to bake bread.

BREAD AND PASTRY MAKING

RAISED BREAD. NO. I

Into a large bowl put one tablespoon of lard and one tablespoon of butter, two teaspoons salt and two teaspoons sugar. Turn over these one cup of water in which potatoes have been boiled; then add one and one-half cups mashed potato. Stir well and add one cup scalded milk. When cool, add one-half yeast cake, compressed, dissolved in one-fourth cup cool water, than add four cups flour. Beat thoroughly and stand in a warm room for six hours or until the mixture is light and spongy. Stir in enough flour to knead easily (about three cups), and knead thoroughly. Let rise till dough doubles in bulk. Knead again till dough is smooth and velvety. Make into loaves. Put into two bread loaf pans lightly greased. Let rise till double in bulk and bake in a moderate oven from forty to fifty minutes.

BREAD NO. II

Dissolve a cake of yeast in a cup of water, then add a cup of milk and a cup of hot water in which a level tablespoonful of lard has been melted. In this liquid put a teaspoon of salt, a tablespoon of sugar and enough flour to make a stiff batter. Beat it well, as you would cake, and let it rise till light. When ready to knead, add enough flour to make a soft dough and knead it until it is light and full of air bubbles. Put it in pans, let it rise double its size and then bake in a moderate oven.

LUNCH ROLLS

One quart flour, one teaspoon salt, two teaspoons baking powder, one tablespoon butter, one pink milk. Sift together flour, salt and baking powder. Melt butter and add to milk. Stir this into flour, etc. With spoon mix to a smooth dough easily handled. Flour molding board, turn out dough, give one or two quick kneadings to give it smoothness. Roll out about one-half inch thick, cut out with round cutter not too large. Lay them in greased baking tin in even rows, just touching. Smooth over with clean muslin dipped in milk. Bake in fairly hot oven twenty-five minutes or less; or, divide kneaded dough into pieces size of an egg, form each by hand into short, thick, tapering roll. Put together in twos, side by side, pinching ends together a little. Place on flat, greased pans. Brush with milk. Bake in very hot oven.

PARKER HOUSE ROLLS

Prepare firm dough as for lunch rolls. Knead and roll out one-half inch thick. Cut into three-inch circles. Press pencil down across middle of each. Rub edges with soft butter. Double each, lay one inch apart on flat greased pans. Brush with milk and bake in hot oven. If sweetening is liked sprinkle granulated sugar over rolls before folding.

FRUIT ROLLS

Mix together one quart flour, one teaspoon salt, two tablespoons sugar, two teaspoons baking powder. Rub in two tablespoons butter. Cut fine one-quarter pound citron, seed and halve one-quarter pound raisins. Mix fruit evenly with dry ingredients, make to a firm dough with milk. Knead on board for a moment, divide into pieces size of egg, make into long rolls, lay one inch apart on flat greased pans, brush with milk. Bake in a very hot oven.

FRENCH ROLLS

Make dough as for lunch rolls. Knead on board. Divide into pieces size of an egg. Form each into a short, thick, tapering roll. Put together by twos, side by side, pinching ends together a little. Place on flat greased pans. Brush with milk. Bake in very hot oven.

COFFEE MAKING

Coffee has come to be regarded as such an integral part of the average American breakfast that it is nothing short of inhumane to serve anything but good coffee, well cooked. The American up-to-date coffee, in which the modern percolator is used, is made by putting a heaping tablespoonful of coffee to every cup of cold water used. Set it on the fire till hot and ready to serve.

The French after-dinner coffee is made by putting two tablespoons of pulverized coffee to each cup of boiling water, the coffee to be percolated from a woolen bag for 10 minutes. A teaspoonful or more of brandy is poured on the top of each cup and ignited, and the coffee is ready to drink.

PIES

The richest pastry for pies is called puff paste, and much skill and practice are required to make it flaky, tender, and very light. First-class puff paste will rise in baking to double its thickness and be in light, flaky layers and without greasiness. The novice must learn to handle it lightly and as little as possible in rolling and turning. It should be put in the ice-box as soon as made and stand at least twelve hours before being used.

Pastry flour should always be used for pie crust. It is whiter than bread flour and when rubbed between the fingers it feels very smooth and soft, life corn-starch. Carefully sift before using.

Where it is desired to have a plainer pastry, or one less troublesome to make and more economical, the use of a small quantity of Royal Baking Powder will give a light and tender crust. As in other cases, the baking powder must be mixed and sifted with the flour before the shortening is added. Sweet home-made lard may be used in place of butter, either wholly or in part, giving a less expensive but equally good and light paste. Never use sour milk or so-called prepared or self-raising flours.

PUFF PASTE

Three cups sifted flour, two cups butter, one egg yolk, a little salt. This is difficult to make. The essentials are: A cool place to make it in, ice broken up in two shallow cake-pans, good flour, and butter, firm, with salt and buttermilk worked out. Sift flour on pastry slab, form it in a ring with back of your hand. Place in center the egg yolk and salt; add a little ice-water, and from inside of ring gradually take flour, adding a little at a time, as you require it, more ice-water, about a cup altogether, until you have smooth, fine paste, very tenacious and lithe. Place in ice-box fifteen minutes, then roll out to size of a dinner plate.

CHOCOLATE TOP FOR CUSTARD PIE

Lovers of chocolate, in any and every form, can make this addition to a common custard pie. Beat one egg to a stiff froth, then add pulverized sugar and grated chocolate with one-half teaspoon extract vanilla. Spread this on the top of the pie and let it harden for a moment in the oven. Or you may prepare it in still another way. Put the chocolate in a basin on the back of the stove, and let it melt (do not put a drop of water with it). When melted beat one egg and some sugar in with it.

In the latter case it will be a regular chocolate brown in color, and in the other a sort of gray.

PEACH TART

For each large peach allow one tablespoon sugar and one tablespoon water. Fill baking dish with sliced peaches, add sugar and water. Cover with pie crust, bake in moderate oven about thirty minutes. Serve hot with cream.

PUMPKIN OR SQUASH PIE

Mix three cups thick stewed and sieved pumpkin or squash, two cups milk, one cup sugar, one teaspoon salt, two eggs, one-half teaspoon cinnamon, pinch cloves. Line two pie plates as for custard pie. Bake in moderate oven.

RHUBARB PIE

One and one-half bunches rhubarb, one and one-half cups suger. Cut fruit in small pieces after stripping off skin. Cook it very fast in shallow stewpan, with sugar. Line pie plate with paste. Wet rim. Add rhubarb, cold. Lay three bars paste across, fastening ends. Lay three more across, forming diamond-shaped spaces. Lay round a rim, wash over with egg, and bake in quick oven fifteen minutes.

LEMON PIE

Line a pie plate with a rich pie crust and bake to a nice brown, then fill with the following dressing: One pint of water put on the stove in a double boiler. Add a pinch of salt, butter the size of a walnut, one full cup of sugar, yolk of one egg and juice of one lemon. Let it come to a boil and stir in a little cornstarch previously dissolved in cold water, but thick enough for a rich cream. Spread over with the white of one egg beaten to a stiff froth and slightly sweentened. Place in the oven to brown. This is a plain, wholesome and easily made pie.

CREAM PIE

Put one and a quarter cups of milk in a double boiler. Rub a third of a cup of butter and a third of a cup of flour together, and stir into the scalded milk. Beat the yolks of three eggs until light, add one cup of sugar and stir into the hot mixture, stirring the whole over the fire until thick. Then take it off the fire and add one teaspoonful of vanilla. Make a meringue of three egg whites and one-half a cup of powdered sugar, to which has been added half a teaspoonful of vanilla. Pour the mixture into a hot baked crust, spread the meringue over the top and brown in a moderate oven.

A DELICIOUS MINCEMEAT

Three pounds of beef boiled until tender and cooled in the liquor in which it was cooked. One and a half pounds of suet, one peck of Baldwin apples, half a pound of citron, half a pound of candied orange and lemon peel mixed. These ingredients should all be chopped, and with the exception of the apples may be prepared with a meat grinder. When all are prepared and mixed, add the other ingredients.

Two pounds of currants, three of raisins, two of brown sugar, one-third of a cup of salt, one-quarter of a cup of cinnamon, two tablespoonfuls each of cloves, allspice, one of mace and a half a tablespoonful of pepper, three grated nutmegs, juice and grated rind of two lemons, half a gallon of cider and one quart of meat liquor.

Let the mixture boil gently for half an hour, then take it off the stove and while cooling add a quarter of a cup each of vanilla and orange extract, and two tablespoonfuls of almond extract. Mix very thoroughly and put away in a cool place and add wine or liquor as desired when making into pies.

The housekeepers of America today make 70 per cent of all the bread, the remaining 30 per cent made by the bakers involving a capitalization of over $270,000,000.

PERSONALS

Mr. D. M. Young, formerly Division Superintendent at De Sabla, has just returned from South America, and is at present making his headquarters in Marysville.

Mr. A. L. Wilcox, Engineer in the Construction Department during the building of the Deer Creek Power House, and who has recently been in the contracting business in San Francisco, has just left for a trip of several months to United States of Colombia, South America.

Mr. L. H. Newbert left San Francisco, Friday, the 20th, to attend a convention of the National Commercial Gas Association, held in Denver the week of October 23-28. Mr. Newbert, prior to returning to San Francisco, will visit Portland and the Northwest.

Mr. Frank E. Oldis, who recently suffered an injury to his arm, is convalescing rapidly, and we trust will soon be back at his old position in the office.

The wedding of William A. Cavanaugh and Miss Edith Stadtfeld was celebrated at the bride's home, 1316 Leavenworth Street, on Wednesday evening, November 15th, 1911, the Rev. William K. Guthrie officiatin. Mr. Cavanaugh is in the book-keeping department of the San Francisco Gas and Electric Company, and Miss Stadtfeld only recently resigned her position with the same company. The bride was given away by her father, Mr. J. B. Stadtfeld. The best man was Mr. William B. Stadtfeld, her brother, and the bridesmaid was Mrs. Lillian Johnson. The happy young couple have gone South on their honeymoon, and upon their return will take up housekeeping in this city. They received a number of beautiful presents.

Referring to the baseball announcement, page 189, October magazine:

They beat us.

Good Luck, Bill!

By EUGENE A. BEAUCE.

Bill Cavanaugh was a good old sport,
A jolly sort of "guy,"
He'd laugh and joke at any time,
His spirits they ran high.
Dear Old Bill!

A change has come upon him now,
He does not seem the same,
His smiles are few and far between,
The girls say: "What a shame!"
Nice Old Bill!

What caused this sudden change in Bill,
This gazing into space,
That frown upon his classic brow,
That far-away look in his face?
Good Old Bill!

The "low-down" of it all is out,
Bill craves the married life,
He plans to make a serious move,
He's going to take a wife.
Grand Old Bill!

Good-by to good old bachelor days,
Farewell to the midnight lark,
It's home right after work for Bill,
No joy rides after dark.
Fine Old Bill!

No more to roam the "Great White Way,"
He'll have the big desire,
At 6 A. M. he'll have to rise,
To light the breakfast fire.
Poor Old Bill!

So cheer up, Bill, you'll soon get used
To wifey's home-made buns,
Here's hoping your joys will all be great,
Your troubles—little ones!
Good Luck, Bill!

The engagement of William Fitzpatrick and Miss Elizabeth Herlihy, both employees of the San Francisco Gas and Electric Co., has been announced. Miss Herlihy is one of the three attractive young ladies in charge of the information desk, and Mr. Fitzpatrick is a shining light on the statement taker's staff. The engagement has been sealed with a handsome solitaire ring, and the marriage will take place some time in June.

At a pretty home wedding, Wednesday evening, November 22nd, Miss Marie Louise Bertaud was married to Mr. Leon Barrett Jones, the popular Assistant Engineer of the Gas Department and located at the Potrero Station, San Francisco.

After a wedding trip to Santa Barbara the young couple will reside at 2940 Pierce Street, San Francisco.

A Wedding in Electrical Society

By EUGENE A. BEAUCE

Mr. KILO WATT and Miss MINI-MUM were married yesterday at 12 o'clock by the Rev. Dr. AMPERE. The wedding was the culmination of a very pretty romance. Mr. WATT first cast his LAMPS on the fair object of his choice, who is a girl of more than AVERAGE beauty, during an electrical disturbance at the Colgate Power Station. He was immediately smitten with a thousand or more VOLTS of what is called love, and proposed at once. Miss MUM put his love to the TEST, and, finding it O. K., accepted him on the spot.

Mr. WATT told his fiancée he would METER at the church, and there they were made one, after each had signed an indefinite CONTRACT and vowed to be constant for life.

The bride was becomingly attired in a gown of shimmering ELECTRIC blue, trimmed with strings of INCANDESCENT LIGHTS, intermingled with passementerie and lace.

The happy young couple received a FULL LOAD of wedding presents, and will motor to Electra on their honeymoon in Mr. WATT'S 40-HORSEPOWER car. Upon their return they will take up housekeeping on an ARC near Belvedere. Their many friends predict that they will get along FIRST RATE in their matrimonial venture.

While visiting the Gas Works in Sacramento, November 9th, with Mr. Ed. Jones, Superintendent, the writer was treated to a very agreeable surprise by Mr. Westcott of the Supply Department.

A false fire alarm was turned in from the Supply Department by Mr. Westcott tripping one of the alarm stations. The large alarm whistle on the Gas Works responded immediately, and within a space of time a trifle less than one-half minute, every hose and chemical fire station in both the Gas Works and the Supply Department was manned by men trained to respond immediately and report at specified stations; the large pump in the Gas Works was thrown into action and water turned in the hose lines. A more perfect and instantaneous response to a fire alarm could hardly be accomplished, and both Mr. Jones and Mr. Westcott are highly complimented upon the efficiency and perfect team work which is being carried on in protecting the Company's properties in Sacramento under their control.

R. J. C.

Through the courtesy of Manager Don C. Ray of the Martinez District of the Pacific Gas and Electric Company the *Gazette* now receives each month a copy of the PACIFIC GAS AND ELECTRIC MAGAZINE, a monthly publication of the same company. These books, which contain much valuable information and good reading, are kept on file in the *Gazette* office.

Martinez Gazette, August 26.

QUESTION BOX

Ask questions. Any one of the several thousand men and women in the Pacific Gas and Electric Company who wishes information pertaining to any phase of the company's work or concerning matters of common interest to residents of any section reached by the company's lines is urged to use this department freely. Send your questions to the magazine. There will be no charge.

Question.—What are the advantages of a three-phase transformer over three single transformers for a three-phase motor installation?

Answer.—Low cost, small weight, small cost to install.

Question.—What will be the capacity of a 100 kilowatt, 133 cycle, 2,000 volt transformer when operating on 60 cycles on normal voltage?

Answer.—The capacity will not materially increase; the transformer will run cooler as iron losses will be less.

Question.—Three 100 kilowatt delta connected transformers are operating on a balanced three phase lighting load. If one burns out what is the equivalent capacity of the remaining two?

Answer.—Approximately 58% of 300 kilowatt or 174 kilowatt.

RECENT ADDITIONS TO THE LIBRARY OF THE PACIFIC COAST GAS ASSOCIATION.

Municipal Chemistry by Charles Baskerville.
Nitro Cellulose Industry by Worden.
Lectures on Illuminating Engineering at Johns Hopkins.
Essential Factors in the Formation of Producer Gas by J. K. Clement, T. H. Adams and C. N. Haskins.
Flow of Heat Through Furnace Walls by Walter T. Ray and Henry Kreisinger.
Principles Scientific Mangement by Taylor.
Gas Fitters and Plumbers' Guide by J. D. Galloway.
The Construction and Working of Internal Combustion Engines by R. E. Mathat.
Synopsis of Internal Combustion Engines, by Hugo Guldner.
Heat Engines, by Allen and Bursley.
A Text Book of Gas Manufacturers, by John Hornby.
Oil Fuel, by Sydney H. North.
Distribution by Steel, by Henry Woodall and B. R. Parkinson.
Elements of Physical Chemistry, by Harry C. Jones.
Pumping Machinery, by Arthur M. Greene, Jr.
Modern Brickmaking, by Alfred B. Searle.
Power Plant Testing, by James A. Moyer.
Electric Central Station Distributing Systems, by Gear and Williams.

It is the aim of the Librarian to increase the usefulness of the library by the purchase of interesting books, and the members are urged to keep these books in circulation. Any book will be sent post paid to any member of the Pacific Coast Gas Association upon application to the librarian, E. C. Jones, 445 Sutter Street, San Francisco.

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THE PACIFIC GAS AND ELECTRIC COMPANY

SUPPLIES HEAT, LIGHT AND POWER TO

Place.	Population.
Agua Caliente	50
*Alameda	23,383
**Albany	800
‡Alta	200
Alto	30
Alvarado	200
Allegheny	200
‡Amador	200
Angels Camp	3,200
Antioch	3,000
‡Auburn	2,376
Baden	1,500
Barber	200
**Belmont	600
Belvedere	481
Benicia	3,360
Ben Lomond	800
**Berkeley	40,434
Bethany	200
Big Oak Flat	150
Biggs	750
Bohemian Grove	25
Brentwood	200
Brighton	100
Broderick	500
‡Brown's Valley	50
**Burlingame	5,000
Byron	200
Campbell	1,000
Camp Meeker	200
Cement	1,500
Centerville	500
‡Centerville	20
**Chico	13,000
Chittenden	50
**Colusa	1,582
‡Colfax	400
**Colma	500
Concord	1,500
Cordelia	150
Corte Madera	350
Cordova	25
Cornwall	300
Crockett	2,500
Crow's Landing	375
Davenport	1,000
‡Davis	750
Decoto	350
‡Dixon	1,000
Dobbins	50
‡Drytown	100
Duncan Mills	150
Durham	500
‡Dutch Flat	400
Eagle Nest	50
‡East Auburn	1,500
**Easton	500
**East San Jose	1,500
Eckley	20
Eldridge	1,000
‡Electra	50
Elmira	150
El Verano	100
Emerald	50
**Emeryville	2,000
Encinal	20
Fairfax	250
Fairfield	800
**Fair Oaks	250
Felton	300
Folsom	1,500
Forestville	100
*Fresno	24,892
Gilroy	2,000
Glen Ellen	500
‡Gold Run	100
Grafton	350
†Grass Valley	4,520
Gridley	1,800
Groveland	50
Guerneville	500
Hammonton	500
**Hayward	4,000
Hollister	3,000
Ignacio	50
‡Ione	900
Irvington	1,000
‡Jackson	2,035
‡Jackson Gate	50
Kennedy Flat	50
**Kentfield	200
Knight's Landing	350
Larkspur	594
Lawrence	100
‡Lincoln	1,402
Live Oak	200
Livingston	200
Livermore	2,250
‡Loomis	150
Los Altos	200
Los Gatos	3,000
Manlove	50
Mare Island	500
‡Martell	25
Martinez	5,000
**Marysville	5,430
Mayfield	1,500
Mayhew	50
**Menlo Park	1,500
Meridian	300
Middle River	75
Mill's College	150
**Milbrae	300
Mills	350
Mill Valley	2,551
Mission San Jose	500
Mokelumne Hill	150
Monte Rio	50
Mountain View	2,500
**Napa	5,791
Napa Junction	250
†Nevada City	2,689
Newark	700
‡Newcastle	600
New Chicago	25
Newman	1,000
Niles	800
Novato	250
**Oakland	225,000
**Oak Park	8,000
Occidental	400
Ophir	50
Oroville	2,500
Orwood	50
Oswald	25
Pacheco	200
**Palo Alto	6,000
Patterson	100
Penon Blanco	25
‡Penryn	250
Perkins	200
**Petaluma	5,880
**Piedmont	2,000
Pike City	200
Pinole	1,500
Pittsburg	2,200
Pleasanton	2,000
Port Costa	600
**Redwood City	3,500
**Richmond	6,802
Rio Vista	884
‡Rocklin	1,026
Rodeo	100
‡Roseville	2,608
**Ross	556
Routier	30
***Sacramento	52,000
San Andreas	200
**San Anselmo	1,531
**San Bruno	1,500
**San Carlos	100
**San Francisco	416,912
**San Jose	40,000
San Juan	150
**San Leandro	4,000
**San Lorenzo	100
**San Mateo	7,000
San Pablo	1,000
**San Quentin Prison	1,600
**San Rafael	5,934
Santa Clara	8,000
Santa Cruz	11,146
**Santa Rosa	7,817
Saratoga	200
Sargent	50
Sausalito	2,383
**Sebastopol	1,233
Selby	100
Smartsville	300
Sonoma	1,200
**So. San Francisco	2,500
Stanford University	2,000
**Stege	100
‡Stockton	23,253
Suisun	1,200
Sunnyvale	2,000
‡Sutter Creek	2,000
Terminus	50
Tiburon	100
Tormey	150
†Towle	200
Tracy	1,200
Vacaville	1,177
**Vallejo	11,340
Vallejo Junction	10
Vernalis	50
Vineburg	200
Walnut Creek	350
Warm Springs	200
Watsonville	4,446
Wheatland	1,400
Winters	1,200
**Woodland	3,187
Yolo	350
**Yuba City	1,160

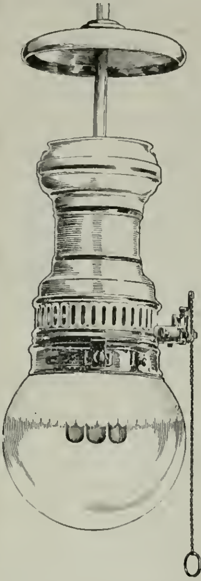
*—Gas	48,275
**—Gas and Electricity	847,139
‡—Electricity and Water	41,445
***—Gas, Elec. and Street Car Service	52,000
†—Electricity, Gas and Water	7,409
Unmarked—Electricity only	115,307
	1,111,575

Service Furnished.	Number of Towns.	Total Population.
Electricity	204	1,062,866
Gas	52	946,328
Water	20	42,894
Street Car	1	52,000

EMPLOYS 3,500 people

OPERATES 11 hydro-electric plants in the mountains
3 steam-driven electric plants in big cities
18 gas works

SERVES ⅔ of California's population
30 of California's 56 counties
An area of 37,950 square miles
⅗ the size of New York state
½ the size of all the New England states combined



New Humphrey 30 Single Bunsen Arc

SIMPLE IN CONSTRUCTION
LOW IN MAINTENANCE COST

ELECTRICAL TESTING LABORATORY, N. Y., TEST MADE ON THREE BURNER ARC

Pressure	3.2
M. L. H. C. P.	375
Consumption per cu. ft. per hour	10.86
M. L. H. C. P. per cu. ft. per hour	34.5

BUILT TO STAND HARD SERVICE

GENERAL GAS LIGHT CO.

SAN FRANCISCO KALAMAZOO NEW YORK

The Pacific Telephone and Telegraph Company

Good Service at Fair Rates

PACIFIC GAS AND ELECTRIC MAGAZINE

Published Monthly by
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO

VOL. 3 DECEMBER, 1911 NO. 7

GLIMPSE OF BEAUTIFUL LAKE MERRITT.

OAKLAND NUMBER

ASSOCIATED OIL COMPANY

GENERAL OFFICE
Wells Fargo Building
San Francisco

Telephone Kearny 4800

FOR SALE.

The Pacific Gas and Electric Company has for sale the following machinery:

ENGINES

MAKE	H.P.	COMPOUND	CYLINDER	STROKE	RPM	PRESSURE	FLY WHEEL	CONDENSER
Ball	185	Tandem	12"-20"	16"	250	115 lbs.	74" D 15" F. Belt	Surface
Ball	350	Tandem	18"-28"	18"	208	120 lbs.	86" D 17" F. Belt	Surface
Ball	150	Cross	13"-22"	12"	300	125 lbs.	75" D 17" F. Belt	None
Hamilton-Corliss	450	Tandem	22⅜"-42⅞"	48"	75	110 lbs.	22' D 1½" Rope 14 Grooves	Surface
McIntosh-Seymour	400	Tandem	15"-30"	36"	136	155 lbs.	12' D 1¼" Rope 24 Grooves	Surface
Westinghouse	75	Cross Vertical	10"-14"	12"	350	125 lbs.	75" D 15¼" F. Belt	None
Ball & Wood	700	Cross Vertical	21½"-45½	20"	150	155 lbs.	Direct conected to Gen. Elec. Co. Rev. Field Generator 500 K W. 3 phase 2300 volts 60 cycles	Surface

BOILERS

One Heine Water Tube Boiler—200 HP., 135 lb. pressure, 87 tubes 3½" x 16'.

For further information and prices, kindly communicate direct with Mr. GEO. C. ROBB, Superintendent of Supplies, 445 Sutter Street, San Francisco.

Pacific Gas and Electric Magazine

Vol. III

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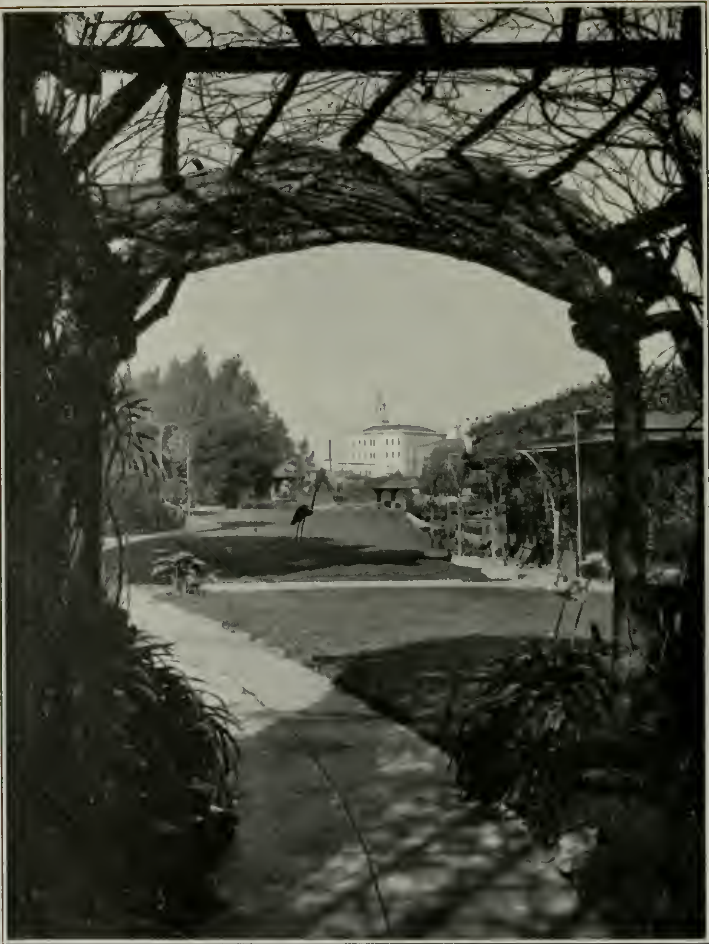
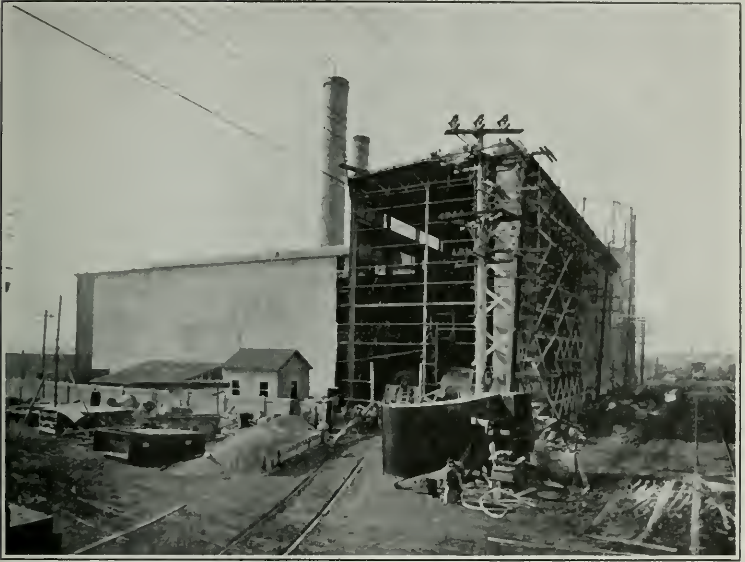


A GLIMPSE of the beautiful grounds surrounding the residence of Mr. A. Schilling, located on the shores of Lake Merritt, Oakland. This artistically laid out private park is surpassed by none in California. On the lake front there are floating gardens, boat houses, and a portion of the grounds are laid out in tennis courts, conservatories, grottos and an observatory.

PACIFIC GAS AND ELECTRIC MAGAZINE

VOL. III DECEMBER, 1911 No. 7

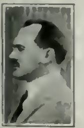


View of turbine room construction work. Taken from First and Jefferson Streets. Shows new steel stack, 125 feet high, 10 feet in diameter.

12,000 Kilowatt Turbine Installation

Station "C" Oakland

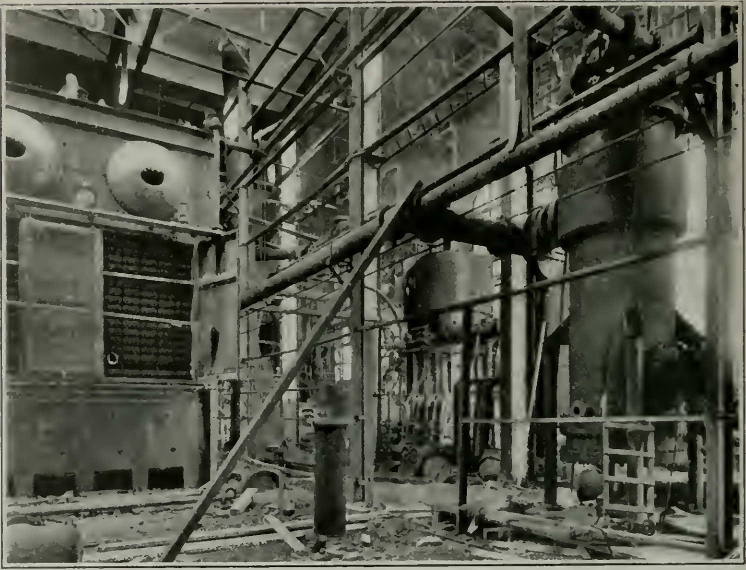
By ERNEST B. PRICE, Department of Operation and Maintenance.



E. B. Price

In December, 1908, a 9,000-kilowatt turbine was installed at First and Jefferson Streets, Oakland, and has been operating continuously ever since. It was deemed advisable, however, to further protect the consumers of the Company by installing a sister unit of greater capacity to meet any emergency which might arise. With this end in view, a 12,000-kilowatt General Electric vertical turbine was ordered, and is now being installed at this point on the Company's line of service defense.

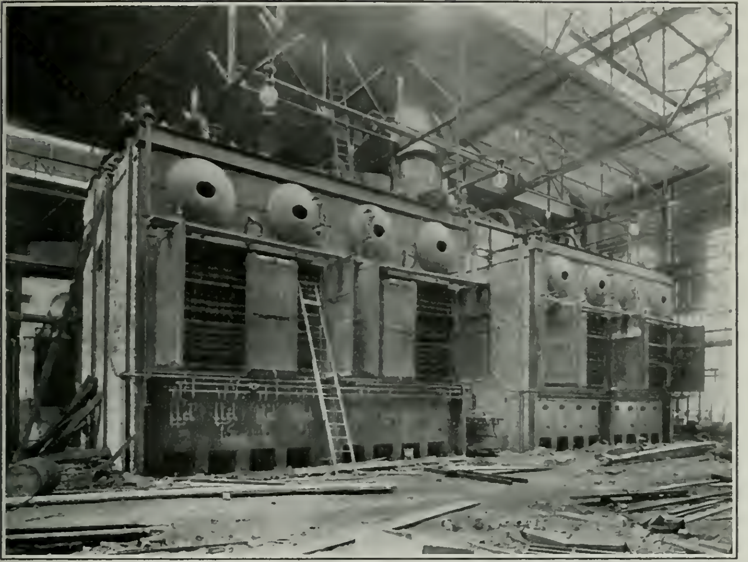
This new unit differs from the previous unit in that the condenser is contained in the base



Construction work inside Station "C," showing the feed water heater to the right, 773-horsepower Parker boilers to left, 12,000-kilowatt turbine in background.

of the turbine. It is interesting to note that this condenser contains 5,600 tubes, each 17 feet 2 inches long, which, if placed in a continuous line, would extend a distance of 18 miles. The condenser requires 25,000 gallons of water per minute, or 36,000,000 gallons per day. As the combined water used by Oakland, Berkeley and Alameda is 19,000,000 gallons per day, this turbine uses more water than the combined consumption of the Bay Cities by 89 per cent, and if the water used by the smaller unit is added to this, or 25,920,000 gallons per day, the two turbines use more than three times the quantity used by Oakland, Berkeley and Alameda. The packing used in the condenser is what is known as corset lacing packing, and 6½ miles of this material is required.

The turbine is technically rated as 12,000 kilowatts, 720 R.P.M., 4,150 volt, 60 cycle, 3 phase vertical turbo-generator set, condenser base type, the base dimensions being 17′ 6″ x 17′ 0′, and the height 33′ 4″. When revolving at its normal speed of 720 revolutions per minute, a point on the outer edge of one of the disks travels at the rate of 400 feet per second, or 270 miles per hour. For ventilation purposes, that is, for cooling the generator windings, the turbine requires 50,000 cubic feet of fresh air per minute. This great volume of air can be better appreciated when it is stated that in breathing, 5 cubic feet of fresh air per person per minute, is required for perfect ventilation. On this basis, the turbine uses as much fresh air every minute as is required by an audience of 10,000 people, which is the capacity of the Greek Theatre in Berkeley. The rotating parts of the turbine weigh 75 tons, and the total weight is 320 tons.



Construction work in the boiler room, showing the battery of four 773-horsepower tube Parker boilers.

Boilers: The turbine is supplied with steam from four 773-horsepower water-tube boilers of the Parker type; each boiler containing 366 4-inch tubes, 20 feet long; heating surface, 7,734 square feet; grate surface, 48 square feet.

Condenser: Worthington 2-stage; 25,000 square feet cooling surface, turbine base type.

Heater: Wheeler vertical closed type, 2,000 square feet heating surface.

Accumulator: R. D. Wood & Co., 11½″ x 14′ 0″ stroke; hydraulic; accumulator tank ballast type; 1,150 pounds working pressure.

Oil Tank Filter: Turner, 12′ 3″ x 4′; 5′ 0″ high.

Hot Well Tank: 10′ 0″ x 6′ 0′ x 5′ 0″ high.

Rotative Dry Vacuum Pump: Laidlaw-Dunn Gordon Co.; size of cylinders, 14″ x 39″ x 30″; weight, 60,000 pounds.

Circulating Pump: Byron Jackson; capacity, 40,000 gallons per minute.

Circulating Pump Engine: American Engine Company; size of cylinders, 16″ and 27″ x 35″.

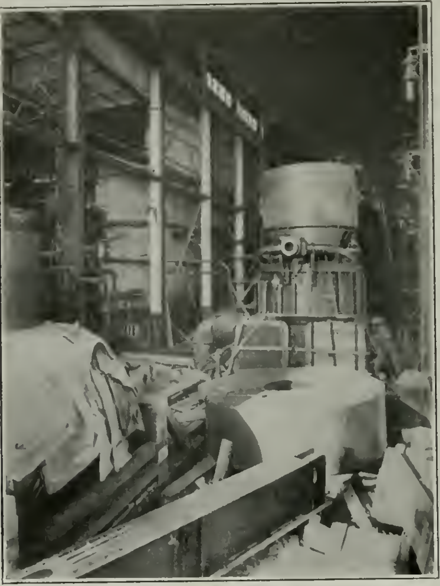
Turbo-Exciter: Curtis Horizontal; 125 kilowatts.

Feed Pump: Alberger Pump Co., 4-stage turbine pump.

Hot Well Pumps: Worthington, turbine-driven, 2-stage; Worthington, motor-driven, 2-stage.

Step Bearing Pumps: 2, Dean, 12″ x 2⅞″ x 12″.

Guide Bearing Pumps: 2, Dean, 5½″ x 3¾″ x 5″.



Construction work in the turbine room, showing the 12,000-kilowatt with the condenser contained in the base. The 9,000-kilowatt turbine can be seen behind this new unit.

Oil Return Pumps: 2, Snow, 5¼″x4¾″x5″

Steel Stacks: 125′ high and 10′ diameter.

The plant will have a total capacity of 21,000 kilowatts. The turbines can be operated in parallel with the main transmission lines of the Pacific Gas and Electric Company, or separately on the Oakland load. The arrangement of the plant is such that future extensions can be made without in any way interrupting the service. The efficiency of the turbines, either when floating on the line and used for voltage regulation, or in giving assistance to the transmission lines, has been fully demonstrated. Their ability to quickly take a load, in cases of emergency, renders them invaluable when viewed from the standpoint of auxiliaries to our hydro-electric system.

In closing, it is interesting to note that our generation station at First and Jefferson Streets, has passed directly from the era of the rope-drive type of apparatus, to the highest development of present-day prime movers, and in its history has eliminated the second stage of the journey, namely, direct-connected reciprocating engines, and stands today a thoroughly modern plant in every detail, capable of protecting that most valuable and intangible asset of any company—Continuity of Service.

* * *

GENIUS IS ONLY THE POWER OF MAKING CONTINUOUS EFFORTS. THE LINE BETWEEN FAILURE AND SUCCESS IS SO FINE THAT WE SCARCELY KNOW WHEN WE PASS IT—SO FINE THAT WE ARE OFTEN ON THE LINE AND DO NOT KNOW IT. HOW MANY A MAN HAS THROWN UP HIS HANDS AT A TIME WHEN A LITTLE MORE EFFORT, A LITTLE MORE PATIENCE, WOULD HAVE ACHIEVED SUCCESS. AS THE TIDE GOES CLEAR OUT, SO IT COMES CLEAR IN. IN BUSINESS, SOMETIMES, PROSPECTS MAY SEEM DARKEST WHEN REALLY THEY ARE ON THE TURN. A LITTLE MORE PERSISTENCE, A LITTLE MORE EFFORT, AND WHAT SEEMED HOPELESS FAILURE MAY TURN TO GLORIOUS SUCCESS. THERE IS NO FAILURE EXCEPT IN NO LONGER TRYING. THERE IS NO DEFEAT EXCEPT FROM WITHIN, NO REALLY INSURMOUNTABLE BARRIER SAVE OUR OWN INHERENT WEAKNESS OF PURPOSE.

Electric Motors Displacing Steam in Factories

By J. E. VAN HOOSEAR, Assistant Engineer, Industrial Department.

J. E. Van Hoosear

While in pursuit of business as an electrical engineer, one has the opportunity of visiting a great many manufactories and observing the processes through which the different products go before they are ready for the market. In this State, and especially in the City of San Francisco, the Italian population is large, and their appetite for Italian paste is known to us all, but not the process of its manufacture. The flour used is not made from the ordinary wheat, but from Semolina wheat, which is very rich in gluten, a property which allows it to be pressed into different forms and dried without becoming so brittle that it would not hold together.

The name "macaroni" generally used, is taken from the Italian word "maccore," meaning to bruise or crush, and, therefore, we may infer that paste was made at a very early date in history by mixing crushed wheat with water and drying it in the sun, to be used later.

The paste of today is made in many shapes and sizes, but it is all formed from the same dough. The flour is mixed with warm water, two gallons to every one hundred pounds, in a drum-shaped receptacle containing a number of paddles, which revolve by means of power, which thoroughly mixes it; the mixture is then removed to a revolving table and kneaded by means of revolving corrugated rollers, until it is in the form of a thick dough. From here it is placed in a power press, consisting of a cylinder with a close-fitting plunger, which forces the paste through the mold that forms the bottom of the cylinder, under a pressure of four thousand pounds to the square inch.

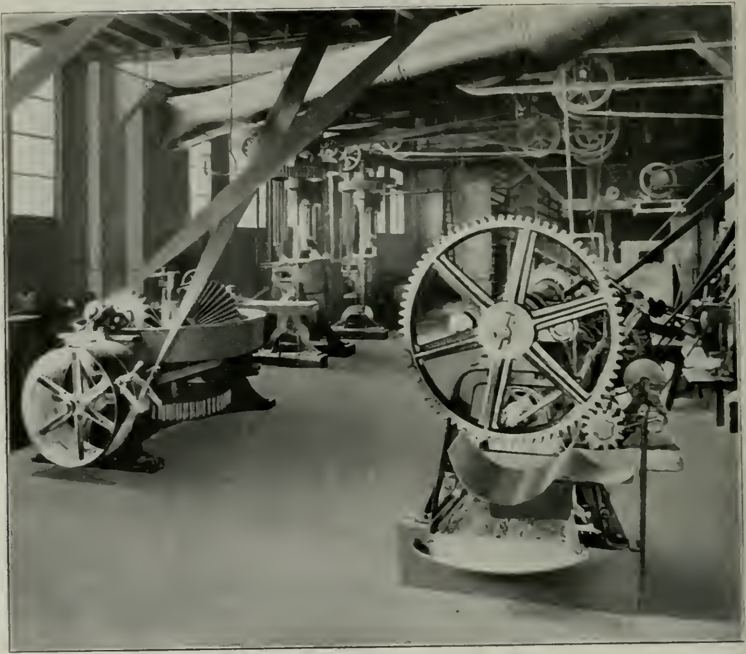
The molds are made of copper, one and one-half inches thick, and are pierced with holes so shaped as to form the different paste products. When pipe or tube macaroni is made, the openings in the disk widen internally, and mandrels, the gauge of the tubes to be made, are centered in them. Figured paste is formed by placing the cylinder horizontally, the end closed with a disk, pierced with holes, having the sectional form of the paste desired, and a set of knives revolves against the external surfaces, cutting off the paste in sections as it exudes from the openings.

After being formed, the macaroni has to be hung on racks and thoroughly dried, which is hastened by artificial means produced by a series of power-driven wooden fans.

As the paste is mechanically made, a steam engine was formerly used to drive the machinery and was found a very convenient form of power, as it was necessary to maintain a boiler to furnish hot water for mixing the flour, and steam to keep the presses, which are steam jacketed, warm. Since the development of the electric motor, its superior quality was soon discovered by the up-to-date manufacturer, as it is free from dirt, takes up very little room, is always ready to be used when needed, and has been installed in all modern factories where clean, wholesome paste is made.

The hot water and steam problem has been overcome in the electrically driven plants by means of a small gas-heated boiler.

Very recently several motors were installed in the large factory of N. Nunzieto & Son, 425 Broadway Street, San Francisco, and through the courtesy of this firm



Part of the machinery in the Macaroni factory of N. Nunzieto & Sons.

we were able to secure the accompanying cut showing the machinery and motors described.

A word here regarding changing from steam to electric drive will show the economy in using a motor:

The average monthly operating expense, previous to the motor installation, was about $180.00, and since the change, the monthly expense for power and hot water is about $80.00, far exceeding the expectation of those interested.

A nice motherly looking old lady got on a Sutter-street car at the Market-street terminal and seated herself near the door. She had darling ringlets of gray and a black silk dress and a bonnet of the type designed for nice, motherly old ladies.

She rode as far as Grant Avenue, her hands folded demurely in her lap. Then she looked up at the conductor and, in a voice of almost baritone quality, said:

"Say, you! Leave us off at the gas-house!"

"Where?" asked the conductor, somewhat taken by surprise.

"Leave us off at the gas house!" she said. "I want to pay me bill!"

"Oh, you mean the Gas and Electric Company!"

"Sure!" said the demure old lady.

San Francisco Chronicle, Sept. 15.

The Electric Pumping Plant of the Peoples Water Company, Oakland

By C. J. WILSON, Assistant Engineer, Electric Distribution.

C J Wilson

A twenty-four-hour load is the exception rather than the rule on an electric distribution system, though one of the most desirable from the standpoint of the operating company. The recently completed electric pumping plant of the Peoples Water Company of Oakland represents an ideal installation, both from the standpoint of the company supplying the power and the consumer.

The principal advantages from the company's standpoint may be enumerated as follows:

1st. The concentration of a large load at one point, thereby reducing the line and transformer installation to a minimum and reducing the line and transformer losses as compared with a distributed load made up of small installations.

2d. A continuous load using a maximum quantity of current in kilowatt-hours with a minimum investment and operating cost, in as much as the transformer installation must be sufficient to take care of the maximum horsepower demand, whether the demand exists for a few moments or twenty-four hours daily.

From the consumer's standpoint, the following advantages may be enumerated:

1st. Small floor space required.

2d. Efficiency of individual motor-drive direct connected to pumps.

3d. Quick starting feature.

4th. Low fire hazard of electric apparatus as compared with steam boilers or gasoline or oil engines.

5th. Reliability of service.

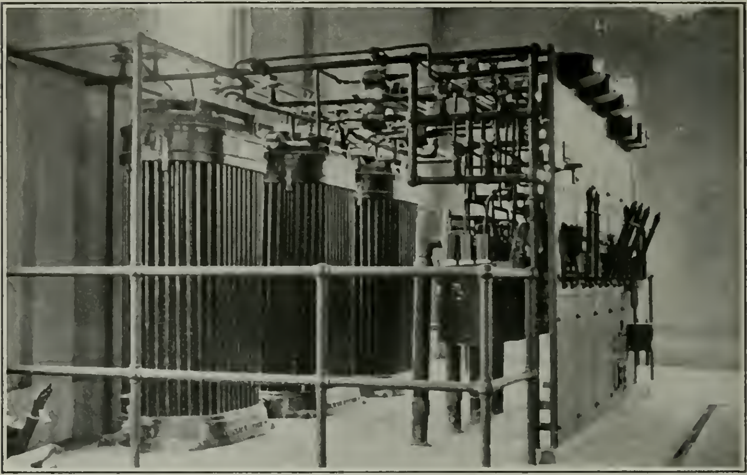
6th. Low first cost.

7th. Low depreciation.

8th. Low operating cost.

9th. Cleanliness and quiet operation. This is particularly necessary in a residence district such as exists in the neighborhood of this plant.

For about four years prior to the installation of this plant the Peoples Water Company operated a steam-driven pumping plant at Fortieth and Diamond Streets, Oakland. Owing to the increased demand for water in the North Oakland, Claremont and Berkeley Districts, it became necessary to enlarge the capacity of this pumping plant. On account of the deterioration of the steam plant, and after careful consideration of the lower rela-



2.—Switchboard and transformer installation.

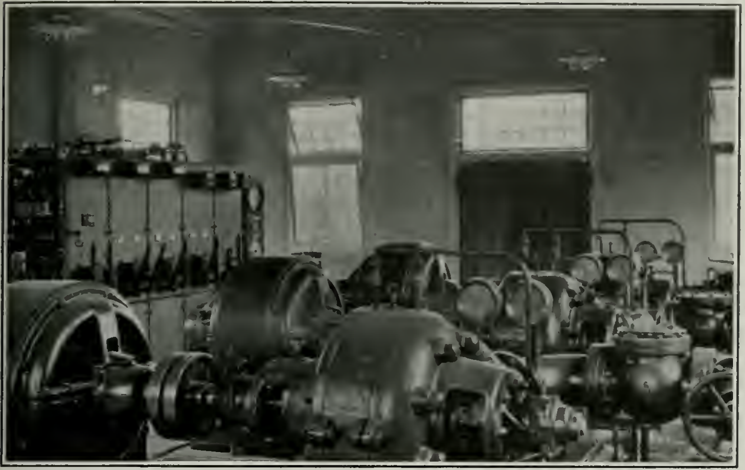
tive investment and operating costs as well as greater reliability of electric-driven equipment as compared with steam. It was decided to build a modern concrete building and install the most approved types of direct-connected motor-driven turbine pumps.

Water is pumped from the large mains at Fortieth and Diamond Streets, Oakland, and discharged through a 16-inch main nearly three miles in length into Claremont Reservoir, at an elevation of 295 feet. The present installation has a capacity of 6,000,000 gallons per day with three units, while provision has been made for the addition of a fourth unit, making an ultimate capacity of 8,000,000 gallons per day.

The substation is constructed of reinforced concrete 30 feet by 44 feet in floor plan, with 18-foot walls. The general exterior appearance, together with what remains of the steam plant foundations, is shown in Fig. 1. The general interior arrangements showing electrical equipment and turbine pumps are shown in figures No. 2 and No. 3. The switchboard consists of five slate panels supported on the pipe frame which carries the bus work and current and potential transformers. One panel carries the company's power meters and control mechanism for the primary oil switch. The other four panels are equipped with triple-pole, double-throw oil switches for controlling the motors. These switches are equipped with overload and no voltage releases and are mechanically interlocked. An indicating wattmeter, voltmeter and ammeter are also mounted on these panels.

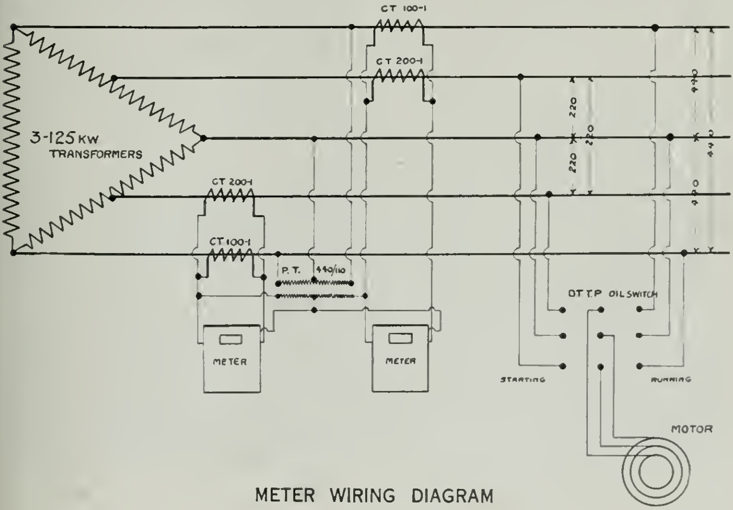
The present pumping equipment comprises three units consisting of 150 horsepower induction motors, direct connected to 8-inch, 2-stage horizontal turbine pumps. The motors are three-phase, 440 volt. Provision has been made for the installation of a fourth unit similar to the present when the demand justifies. Under present conditions, two units are operated continuously twenty-four hours per day with the third unit as a spare.

The service installation, which was made by this company, is supplied by a four kilo-



3.—Interior of People's Water Company's substation, showing electric-motor-driven turbine pumps.

volt, three-phase primary from Temescal substation D, through an underground cable from the pole to the K2 oil switch in the building. Three 125-kilowatt transformers, 6600-2200/220-440 volt are connected to give 220 volt three-phase on the starting bus,



METER WIRING DIAGRAM

and 440 volt, three-phase on the running bus, thus doing away with starting compensators on the motors. The cable, oil switch and transformers can be operated at 11,000 volt Y in case a change in the primary voltage becomes necessary at some future date.

Referring to the meter wiring diagram, it will be noted that current used in starting the motors is registered upon the same meters as the running current; however, in order to compensate for the 220-volt potential used in starting, current transformers having double the ratio of the current transformers used in the running busses, have been used in the starting busses. With the double ratio current transformers only one-half as much secondary current passes through the meter, which compensates for the double potential on the meters taken from the 440-volt bus through potential transformers.

The following excerpts are quoted as indicating the satisfactory operating condition of this plant and appreciation of the efforts of our engineering departments, which are at the service of our consumers at all times.

PEOPLES WATER COMPANY
BROADWAY AND NINTH STREET

Oakland, Cal., June 20th, 1911.

Pacific Gas and Electric Co.,
445 Sutter Street,
San Francisco, Cal.
Attention: Mr. C. J. Wilson,
Asst. Eng. Elec. Distribution.

My Dear Mr. Wilson:

Enclosed find several photographs of our new electric-driven pumping plant, showing the building, pumps, motors, switchboard, and your company's transformer installation.

The whole equipment is working most satisfactorily.

* * * * * * * *

Allow me to express both the company's and my personal appreciation of your services and suggestions in connection with the electrical installation of the plant.

Very truly yours,
(Signed) GASKELL S. JACOBS,
Assistant Engineer,
PEOPLES WATER COMPANY

Decision on License Matter

By W. H. KLINE, General Agent, Pacific Gas and Electric Company.

Superior Judge Seawell of San Francisco recently decided that public-service corporations whose operative property is taxed by the State under the provisions of the Constitutional Amendment adopted November 8th, 1910, are not required to pay local city or county licenses. The City and County of San Francisco, through City Attorney Long, brought suit against the Pacific Telephone and Telegraph Company to recover a city license for the quarter beginning January 1st, 1911 and ending March 31st, 1911. The Telephone Company demurred to the complaint on the ground that under the language of the Constitution they are no longer required to pay licenses, the gross earnings tax which they pay to the State being in "lieu of all other taxes and licenses, State, County and Municipal." Judge Seawell sustained the Company's demurrer, thereby holding that corporations that pay a gross income tax to the State are, under the terms of the Constitution, exempt from licenses.

It is understood that the City will appeal the case in order to obtain a ruling from the Supreme Court. In the meantime, Judge Seawell's decision stands as the law on the question.

The following is a verbatim letter (name and address omitted), recently received in the San Francisco office:

GENTLEMEN: I wauld like to ask you what is the reason you charged so many for my ges bill. Use only but one person and burn just a few hours a night. Use for cooking only once a while. Perhaps yours man made a mistaking or something wrhown in the mater. Will you kindly sand your man up and look at it carefully that be very well for you and myself. If you still charge the same as what you did I reather you take it off I'll burn cold oil for it is so cheaper to aforded.

I thind your man will seattle it all right.

An Oil Tank That Has Traveled

By SHERWOOD GROVER, Assistant Gas Engineer.

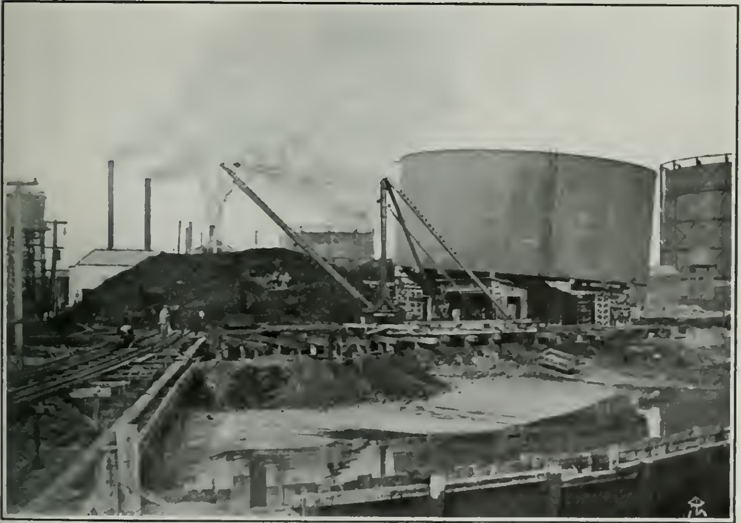
S. Grover

The Oakland Gas Light and Heat Company has always held a record for municipal progressiveness, has endeavored to anticipate, not only development and improvement of the gas business in general, but also to keep abreast, or, if possible, a little ahead of the progress in municipal growth. There is one occasion, however, on record when this company did stand squarely in the path of progress. It was unintentional, however, and the following article explains how we got out of the way.

Not long since the City of Oakland voted bonds for improving the waterfront. The plan upon which the bonds were voted is one of considerable breath, providing for several successive steps to be taken in consecutive years.

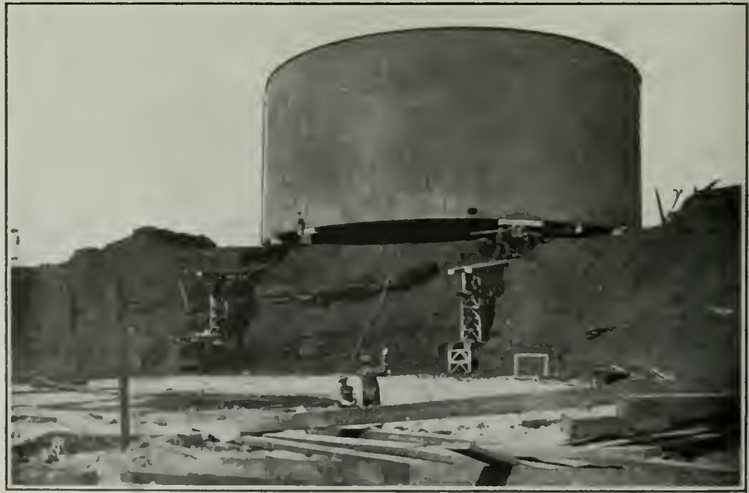
The first step in the development consisted in the building of a concrete wall along the estuary from Fallon to Webster Street, and included condemning a strip of property 150 feet wide to provide for a waterfront street inside of the bulkhead line. This bulkhead line was determined by a recent court decision and necessitated a re-survey of the waterfront.

After the survey had been completed, we found that our 30 M barrel steel oil tank, on concrete pile foundation, was located pretty nearly in the center of the proposed waterfront street. It might be noted that this tank al-



The tank after it had been raised from the original foundation, resting on the house-moving frames, at the same time tilted at a slight angle, before moving toward the crest of the lamphlack pile ready had a past. It was originally built for the Pacific Gas Improvement Company plant in San Francisco and installed in the year 1902, where it rested comfortably up to the year 1906. The P. G. I. Co.'s plant was taken over by the San Francisco Company in the meantime, and hence this plant was not in operation. The rapid development of the Oakland District made it necessary to increase the oil storage capacity without delay. It was decided to move this tank from the P. G. I. plant and install it in Oakland, and this was accomplished after the manner of a house-moving job down to the waterfront, where the tank was placed on two large barges which had been previously firmly lashed together. These were then towed across the bay and up the estuary to a point opposite the gas company's property in Oakland, where previously some temporary piles and caps had been placed to receive the tank, and act as intermediate means of transportation between the barge and the concrete foundation, which was waiting to receive it.

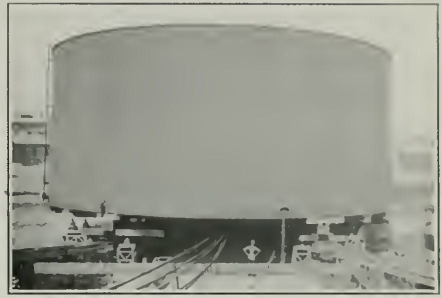
Since the time of first placing the tank on foundation in Oakland and the present, a great pile of lampblack had been accumulated, which about half surrounds the tank. At this time the company was negotiating for property near the gas works, and by the time everything in regard to the property had been settled so that a location for the oil tank could be chosen, the work on the City concrete retaining wall had progressed to a point opposite the gas company's property. The new location chosen for the oil tank (and in most cases the location of an oil tank is made because you cannot put anything else on that special piece of ground) was in such relation to the original position of the tank that it was thought necessary to move the tank around the lampblack pile and across the work then under way by the contractors building the sea-wall. The lampblack pile, it might be mentioned, was higher than the top of the tank itself. Bids were requested for removing the tank to the new location. In the meantime, the necessary concrete pile foundation had been



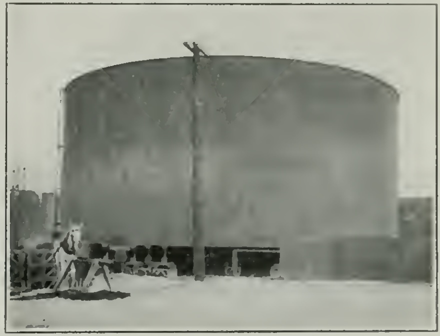
The tank at the crest of the pile, frames being placed ready for the descent onto the new foundation.

installed. When the bids were opened it was found that one contractor's figure was considerably less than the others, and as he had done very satisfactory work for the company on previous occasions he was given the job. At the same time he was questioned as to the reason why his figure was so much less than the rest. He replied that, he supposed the other bidders were figuring on moving the tank around the lampblack and over the construction work of the sea-wall contractors, by which operation they were being held up for $1,000 by the sea-wall contractors, who figured out that there was no other way to get the tank around to the new location, thought they had a "cinch" and were going to use it to the fullest extent possible. When asked what he intended to do, he replied that he would jump the lampblack pile. The photographs illustrate how this was done.

The tank has been doing business steadily since reaching its new location, and we sincerely trust that two moves will end the history of the travels of this particular oil tank.



From a photograph taken from the crest of the pile, showing the tank being skidded down onto its new foundation.



The tank resting on jacks over the new foundation, in which position the bottom was thoroughly scrsped, coated with hot asphaltum before lowering on its new resting place.

* * *

Long-Sought Honest Man Found at Last

Kansas City, Mo., Dec. 11.—If Diogenes were alive he might try Kansas City for the man he was looking for. G. B. Apple believed he was getting more gas than he was paying for, and sent a letter to the gas inspectors, in which he wrote:

"I am sending you a check for $1 to have my meter tested. I think it is slow."

It was found that a broken wheel prevented the meter from registering. Apple's dollar was returned today.

San Francisco Bulletin, Dec. 12, 1911.

What the Press Has to Say

Voluntary Reduction

The "Berkeley Gazette," under date of November 17th, recites the fact that a communication had been received by Mayor Stitt from Manager F. A. Leach, Jr., of Oakland District, announcing that a considerable reduction in rate for both gas and electricity in the City of Berkeley had been determined upon by the Pacific Gas and Electric Company.

The new rates are as follows:

On and after November 1st, 1911, gas for all purposes: First 10,000 cubic feet per month at 90 cents; second 10,000 cubic feet per month at 85 cents; next, 30,000 cubic feet per month at 80 cents, and in excess of 30,000 cubic feet per month at 75 cents.

Heretofore the rate was 90 cents per thousand feet for fuel gas and $1.00 for other purposes.

Electric: On and after December 1st, 1911, electric current for lighting purposes by meter measurement will be maximum 7 cents per thousand watt hours, with a sliding scale for quantity to 3 cents per thousand watt hours. Minimum bill as now authorized by ordinances, $1.00 per month.

The "Annex," of Newman, under date of November 10th, recites the fact that the Pacific Gas and Electric Company has, effective November 1st, 1911, made a reduction in electric current from 15 cents per kilowatt hour to 9 cents per kilowatt hour, with a minimum of $1.00 per month. The old minimum was $1.50.

Large consumers for power and other purposes may secure a rate as low as 4 cents, according to quantity used.

"To make oneself beloved," says an old writer, "is to make oneself useful to others."

Report Made on the Gas Industry

Figures Show That More Capital is Invested and Gross Receipts Greater

Number of Wage-Earners in This Business Increased by 21 Per Cent.

WASHINGTON, D. C., Nov. 19.—A preliminary statement of the general results of the Thirteenth Census of establishments engaged in the manufacture of gas, illuminating and heating, was issued today by Census Director Durand. It contains summaries which give the general figures for 1904 and 1909, and compare the different products by kind quantity. The statistics do not include gas made in coke and other establishments producing gas as a by-product, or producer and blast-furnace gas for power and furnace purposes made by establishments in which they were consumed. The report was made under the direction of William M. Steuart, chief statistician for Manufactures, Bureau of the Census. The figures are subject to such revision as may be necessary after a further examination of the original reports.

THE RATES OF INCREASE

The general summary shows increases in all the items of the census of 1909, as compared with that for 1904, except for miscellaneous expenses, which decreased 6 per cent.

The number of establishments increased 27 per cent; capital invested, 26 per cent; the gross value of products, 33 per cent; cost of materials, 41 per cent; value added by manufacture, 30 per cent; average number of wage earners employed during the year, 22 per cent; amount paid for wages, 23 per cent; number of salaried officials and clerks, 44 per cent; amount paid in salaries, 46 per cent; primary horsepower, 76 per cent.

There were 1,296 manufacturing establishments in 1909 and 1,019 in 1904, an increase of 27 per cent.

The capital invested as reported in 1909 was $915,537,000, a gain of $190,502,000, or 26 per cent, over $725,035,000 in 1904. The average capital per establishment was approximately $706,000 in 1909 and $712,000 in 1904.

VALUE OF PRODUCTS

The value of products was $166,814,000 in 1909 and $125,145,000 in 1904, an increase of $41,669,000, or 33 per cent. The average per establishment was approximately $128,000 in 1909 and $123,000 in 1904.

COST OF MATERIALS USED

The cost of materials used was $52,428,000 in 1909 as against $37,180,000 in 1904, an increase of $15,248,000, or 41 per cent. In addition to the component materials which enter into the products of the establishment for the census year, there are included fuel, rent of power and heat, and mill supplies.

VALUE ADDED BY MANUFACTURE

The value added by manufacture was $114,386,000 in 1909 and $87,965,000 in 1904, an increase of $26,421,000, or 30 per cent. This item formed 69 per cent of the total value of products in 1909 and 70 per cent in 1904. The value added by manufacture represents the difference between the cost of materials used and the value of products after the manufacturing processes have been expended upon them. It is the best measure of the relative importance of industries.

SALARIES AND WAGES

The miscellaneous expenses amounted to $27,757,000 in 1909 and $29,557,000 in 1904, a decrease of $1,800,000, or 6 per cent. Miscellaneous expenses include rent of factory or works, taxes and amount paid for contract work, as well as such office and other expenses as can not be else where classified.

The salaries and wages amounted to $33,316,000 in 1909 and $25,522,000 in 1904, an increase of $7,794,000, or 31 per cent.

The number of salaried officials and clerks was 13,515 in 1909 and 9,406 in 1904, an increase of 44 per cent; their salaries increased from $8,464,000 to $12,385,000, or 46 per cent.

The average number of wage earners employed during the year was 37,215 in 1909 and 30,566 in 1904, an increase of 6,649, or 22 per cent; their wages increased from $17,058,000 to $20,931,000, or 23 per cent.

The primary horsepower was 128,350 in 1909 and 73,101 in 1904, an increase of 76 per cent.

The average horsepower per establishment, considering all establishments, was approximately 99 horsepower in 1909 and 72 in 1904.

GAS AND GAS BY-PRODUCTS BY KIND AND QUANTITY

The number of thousand cubic feet of gas produced was 150,835,793 in 1909 and 112,549,979 in 1904, an increase of 34 per cent.

Carbureted water gas was the kind most largely manufactured, increasing from 54,687,418 thousand cubic feet in 1904 to 79,418,486 in 1909, a gain of 45 per cent. In 1909 it constituted 53 per cent of all kinds; in 1904, 49 per cent. Mixed coal and water gas was the next in importance, with 40,775,283 thousand cubic feet in 1909 and 40,980,414 in 1904, a decrease of 1 per cent. Straight coal gas increased from 12,693,034 thousand cubic feet in 1904 to 18,985,253 in 1909, a gain of 57 per cent.

The greatest percentages of increase in specified gases are shown for acetylene, oil and straight water gas, in the order named, although the quantities of each of these kinds are comparatively small. Acetylene gas increased from 7,880,000 cubic feet in 1904 to 25,186,000 in 1909, a gain of 220 per cent; oil gas, from 3,441,352 in 1904 to 8,688,860 in 1909, or 152 per cent; and straight water gas from 715,550 in 1904 to 1,726,082 in 1909, or 141 per cent.

There was a decrease in the production of coke for sale from 89,186,434 bushels in 1904 to 82,049,683 in 1909, or 8 per cent; but the production of tar increased from 67,515,421 gallons in 1904 to 92,152,938 in 1909, or 36 per cent.

The figures do not include the gas and tar made in retort or by-product coke ovens.

Four establishments engaged primarily in the manufacture of other products made gas, coke and tar as by-products in 1909. If these be added the figures for straight coal gas become 20,012,811,000 cubic feet, and for acetylene gas 38,256,000 cubic feet; for coke, 82,094,030 bushels, and for tar, 92,191,308 gallons. The by-products for 1904 are not available.

San Jose Mercury, Nov. 20, 1911.

$300,000 Is Spent by Gas Co.

Local Plant Almost Entirely Renewed in Little Over Two Years.

Permit to Tear Up Georgia Granted by the City Council.

The Pacific Gas and Electric Company, through Manager Stephens, this morning obtained from the City Council a permit to tear up Georgia Street, between Santa Clara and Branciforte, for the purpose of laying a six-inch main. A check for $480, to cover the cost of putting the street in first-class shape again, was sent with the request for the permit. When this job is completed, Georgia Street will be well served with pipe, a four-inch pipe running down one side and a six-inch pipe on the other.

Manager Stephens declared this morning that in the last two years his company has spent more than $300,000 in Vallejo. This sum is in excess of the amount spent for maintenance. "Vallejo," said the manager, "has the finest kind of pipe service. The pipes run from the bay to the city limits and from South Vallejo to the heights. With the exception of two blocks on Virginia Street, it has all been put in by the new company. We are now changing the $\frac{3}{4}$ service pipe to inch and one-quarter. The local plant is well qualified to serve a city twice the size of Vallejo."

Vallejo (Cal.) *Chronicle*, Nov. 13, 1911.

Begin Laying a Big Gas Main

Poultrymen Will Use Gas Heating for Their Incubators in the Bellevue District.

The Santa Rosa branch of the Pacific Gas and Electric Company will begin work this morning laying an 8,500-foot extension of its gas main in the Bellevue district for the accommodation of poultry raisers who desire to install gas-burning incubators and brooders.

Oscar Abrams, with a large force of men, will begin work at Bellevue station by tapping the main line to Petaluma and will lay a main across the Northwestern Pacific railroad and then north and south on the cross-road for some distance.

A number of large poultry ranches are located in this district, and it is the intention of owners to do all their incubating and heat their brooding houses with gas this winter. The use of gas for this purpose is not at all new, as poultrymen between here and Petaluma and in Petaluma have been using gas for incubators and brooder houses for several years.

The fire risk is almost entirely eliminated by the use of gas instead of coal oil, while the steady heat required for incubating can be maintained, it is said, much more easily with gas than by oil burners. With gas on the place the ranchers can also have it for lighting purposes in their homes, which is a great convenience that is fully appreciated in the country districts.

Santa Rosa (Cal.) *Press-Democrat*, Nov. 15, 1911.

Will Rush Work on Power Line

Fifty Men Will be Employed on Project in Amador This Week.

SUTTER CREEK (Amador County), Nov. 11.—The new pole line in course of construction by the Pacific Gas and Electric Company from Sutter Creek to Electra is nearing completion. A crew of twenty-five men are now at work, and as many more will arrive here next week to rush the work. Both the poles and wires are greatly enlarged over the former line, which became inadequate to furnish power for the many powerful motors now in use on the Mother Lode, and the line is to carry more than 17,000 volts. The entire crew, under Foreman Dubendorf, will go into camp at Butte City this week.

Sacramento (Cal.) *Union*, Nov. 12, 1911.

Motors for Irrigating Installed

During the past season the Pacific Gas and Electric Company has placed over fifty motors for operating irrigating pumps in Yuba and Sutter Counties, and have orders to supply many more as rapidly as they can furnish the service. There is no motive power so successful in pumping as electric motors; they can be started by the pulling of a switch and let run all day without further attention. A woman or child can operate a pumping plant if electric power is used. Ross Traynor is a busy man these days answering questions. The Yuba Construction Company manufacture the most efficient type of pump for irrigation purposes.

Marysville (Cal) *Democrat*, Nov. 13, 1911.

Vallejo's Merits to be Advertised

At the meeting of the Merchants Association held last night a communication was received from the Pacific Gas and Electric Company of this city and San Francisco, in which the corporation offered to publish in the columns of their monthly journal, which has a large circulation and is mailed to all parts of the United States and Canada, an article setting forth all the things which go to make Vallejo a fine city. The offer was accepted, and Miss Marguierite Hunt is to be engaged to collect the necessary data and write the story.

Vallejo (Cal.) *Chronicle*, Nov. 10, 1911.

Gas Tank Given Thorough Test

The new gas tank recently completed by the Pacific Gas and Electric Company at its plant near the Southern Pacific Railroad tracks, was tested yesterday by filling it with water to determine whether or not it would leak under a gas pressure. It is planned to press the tank into immediate service. The tank is fifty-seven feet in diameter and has a capacity of 100,000 cubic feet, treble the next largest plant, which holds 28,000 cubic feet, and a smaller tank, holding some 6,000 cubic feet. The installation of the tank is part of extensive improvements the Pacific Gas and Electric Company has been making in and around Chico, which have entailed an expenditure of $125,000.

Chico (Cal.) *Record*, Nov. 12, 1911.

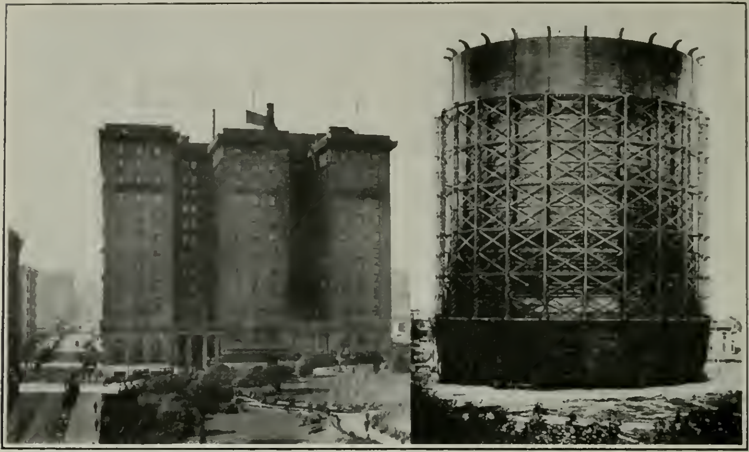
Penngrove Illuminated

The Pacific Gas and Electric Company on Saturday turned on the lights at Penngrove, and there was much rejoicing among the residents of that thriving little town. The Batchelor building, occupied by Peters & Peters and the Evans barber shop, were among the new users of the juice. Many homes in Penngrove will be wired and also many of the ranch houses.

Petaluma (Cal.) *Courier*, Nov. 13, 1911.

I think the first virtue is to restrain the tongue; he approaches nearest to the gods who knows how to be silent, even though he is in the right.

Cato.



On the evening of Monday, November 27th, Mr. John A. Brittton delivered an address before the Mission Improvement Association, his speech being confined principally to the gas business, extensions, improvements, etc., as carried on by the San Francisco district during the last several years.

A number of baloptican views were thrown upon a screen, illustrating the principal points touched upon, and this article calls particular attention to one of these views.

The San Francisco district is now completing at the Potrero Works, a 5,000,000-cubic-foot gas holder, and in order that the readers of this article may have a clear conception of the magnitude of this work and comparative size of the holder, we are reproducing above a photograph of this new gas holder placed alongside of and reduced to the same foot scale as the Powell-Street front of the St. Francis Hotel in San Francisco.

This new holder is 226 feet high, or 46 feet higher than the hotel. The holder tank is 195 feet in diameter, and the extreme outer frame 201 feet in diameter, or 16 feet less than the width of the hotel. It required 30,000 tons of water to fill the different compartments of this holder. R. J. C.

Love Light *vs.* Gaslight

By EUGENE A. BEAUCE, San Francisco District.

He called on his best girl one evening,
They spooned in the parlor till late,
They spoke words of love to each other,
Both felt they had found a soul mate.

Says he: "Darling, I love you sincerely."
"And I love you, too," the girl sighs;
He answers: "I know you do, dearest,
I can see the LOVE LIGHT in your eyes."

"Young man," said her father, who entered
The room as the clock sounded three,
"The light that you see is the GASLIGHT,
And the bill will be charged up to me."

Pacific Gas and Electric Magazine

PUBLISHED IN THE INTEREST OF ALL THE EMPLOYEES
OF THE PACIFIC GAS AND ELECTRIC COMPANY

JOHN A. BRITTON - - - - - - - Editor
R. J. CANTRELL - - - - Associate Editor
A. F. HOCKENBEAMER - - Business Manager

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The Pacific Gas and Electric Company desires to serve its patrons in the best possible manner. Any consumer not satisfied with his service will confer a favor upon the management by taking the matter up with the district office.

Vol. III DECEMBER, 1911 No. 7

EDITORIAL

The Lateness of This Issue calls for an explanation, and it is cheerfully given to the many readers of the Magazine.

During the latter part of the year 1911, history was being made by the Pacific Gas and Electric Company, and the Editor, in common with all the members of the executive staff of the Company, found it necessary to subordinate everything to the accomplishment of those things that have been done to make complete the perfect organization which begins the year 1912.

The largest thing accomplished was the recognition by the banking house of J. P. Morgan and Company of the position occupied by the Pacific Gas and Electric Company in the field of generation and distribution of gas and electricity, by subscribing for twenty million dollars of the new bond issue. This amount will be partially used in retiring the bonds of the Pacific Gas and Electric Company issued when this Company acquired the properties of the San Francisco Gas and Electric Company, and for the retirement of other issues. The balance of about six millions will be used in building extensions of the Company's properties, particularly in development of more hydro-electric plants to meet the constantly growing demands for power for both industrial and for irrigation and reclamation work.

The acquisition of the business of the Metropolitan Gas Corporation was also another event in the year's business.

To some of the old timers, it was noted with regret the passing into obscurity of such old and tried names as San Francisco Gas and Electric Company, Oakland Gas, Light and Heat Company, Sacramento Electric, Gas and Railway Company, and United Gas and Electric Company. These names have had a hold on the hearts of the men who have been associated with these companies for years, and they part with them as with old friends; but "The King is dead, long live the King," and it is all now Pacific Gas and Electric Company, and "Pacific Service" will be for all time to come the slogan of all the loyal employees, and it will mean Continuity, Reliability, Courteousness.

On the principal that it is never too late to do good, the Editor desires to wish to all of our readers

A HAPPY AND PROSPEROUS NEW YEAR.

Authorized Additions and Improvements

ANTIOCH DISTRICT

A three-phase, 4,000-volt service has been extended from Antioch to the Town of Oakley.

FRESNO DISTRICT

Runabout has been purchased for the use of Manager Henderson; also two one-ton electric wagons for use in Gas Service Department.

Arrangements are being made for the installation of a reserve exhauster.

MARYSVILLE DISTRICT

The property of the Live Oak and Encinal Light and Power Company has been acquired and is now operated as part of our system.

MARYSVILLE POWER DIVISION

Work has been commenced on construction of 7½ miles of 11,000-volt line from the Wheatland substation to furnish light and power service to the Trowbridge Tract and the Town of Sheridan.

Construction of 2 miles of 11,000-volt, three-phase line to supply power for drainage pump in Reclamation District No. 803 has been commenced.

NAPA DISTRICT

A new washer, of the ammonia type, is about to be installed at the Gas Works.

OAKLAND DISTRICT

Five new automobiles have been purchased for use in this District, four of them to replace old cars.

Work has been commenced on the extension of gas mains in the district known as Northbrae.

Two two-ton electric trucks have been purchased for use in the Gas and Electric Service Departments.

Work has been commenced on the installation of a conduit line on Fourteenth Street, between Harrison and Alice Streets, in order to supply service to the Oakland Hotel.

SAN FRANCISCO DISTRICT

A 1½-ton Walker electric truck has been purchased for use in the Gas Service and Meter Department.

Three gasoline runabouts have also been purchased for use in the above departments.

A 1,000-kilowatt motor-generator set for installation at Station E.

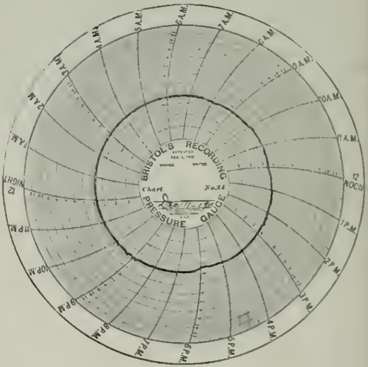
SAN JOSE POWER DIVISION

Arrangements are being made for installation at Redwood substation of three 150-kilowatt oil and air cooled transformers, and one 11-kilowatt I. R. S. automatic regulator. Arrangements are also being made for increasing the transformer capacity at Mountain View substation.

Perfect Gas Service

The chart shown herewith is the record of gas pressure in the City of Chico, December 11th, 1911. This perfect score, while almost unprecendented, is of daily occurrence in Chico, and has obtained for sometime, in fact, ever since the recent overhauling and improving of the system, which has taken place during the last several months.

Such a perfect record can only be obtained when the physical properties of a gas plant are in first-class condition, with ample storage capacity, and a sufficient number of feeder mains to allow of a free supply of gas in every section of the city, irrespective of demand at any time during the twenty-four hours.



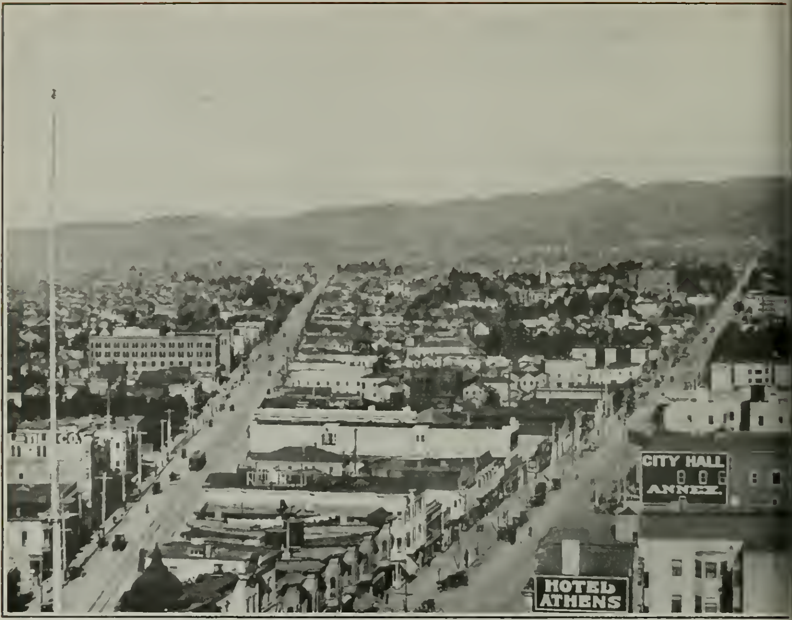
The improvements above mentioned have not been confined to bettering conditions for the immediate present, but have been of a sufficient magnitude to care for a much larger population than the city now enjoys.

The Pacific Gas and Electric Company is not only endeavoring to fulfill its mission of supplying perfect service in Chico, but is gradually bringing all of its properties up to this high standard of perfection and efficiency, and this end will be gained within a very short time.

THIS NUMBER OF THE PACIFIC GAS AND ELECTRIC MAGAZINE, as the front cover denotes, is devoted primarily to the interests of the City of Oakland. Oakland, the second largest city on San Francisco Bay, has had a phenomenal growth, especially since the great fire which visited San Francisco in 1906, and with its rapidly increasing population, is, without doubt, destined within a very short period of time to become the second largest city within the State. Oakland is the terminus of the rail lines of three transcontinental railways, is rapidly developing its miles of waterfront, and transforming what were at one time worthless tide flats, into a deep-water harbor, thoroughly protected, and surpassed by few throughout the world.

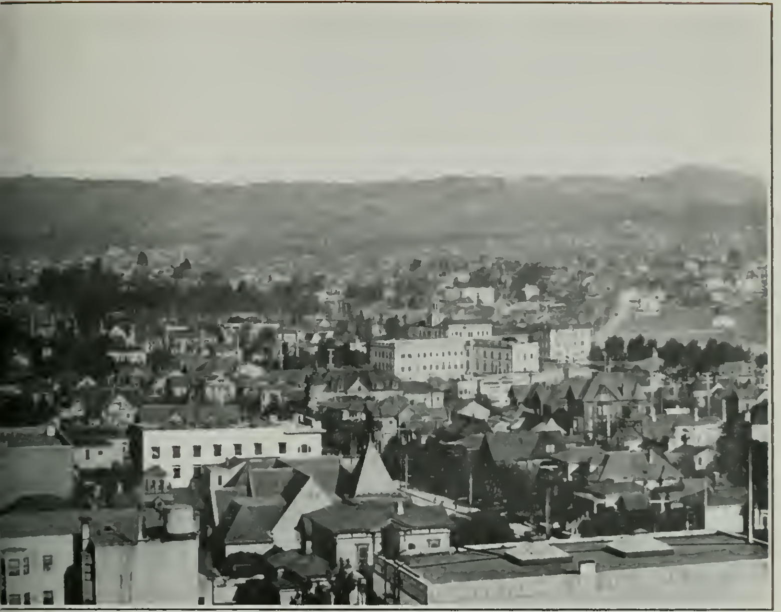
The entire country back of the City of Oakland and tributary thereto, is rapidly developing, electric interurban lines are fast building, and with the ideal climate, its beautiful foothill residential section, rapid transportation facilities with the metropolis across the bay, it is hard to place a limitation, or make a comparison in reference to the future of this wonderful and beautiful city.

We beg to make acknowledgment to the United Property Companies, the Oakland Chamber of Commerce, and the Pacific Photo and Art Company for a number of the photographs reproduced in this issue, most of which were taken during the month of December, 1911.

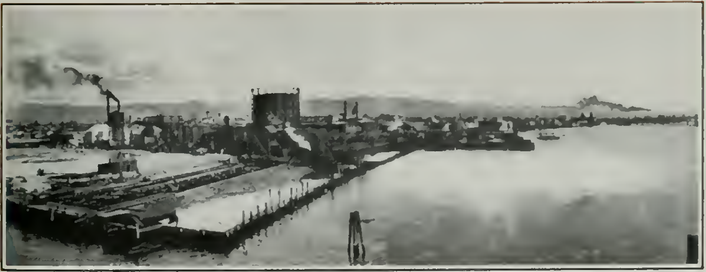


PANORAMA No. 1. Oakland, looking from the business center toward foothills.

A PORTION of the Oakland water front, showing shipping and the plant of the Alaska Commercial Company.



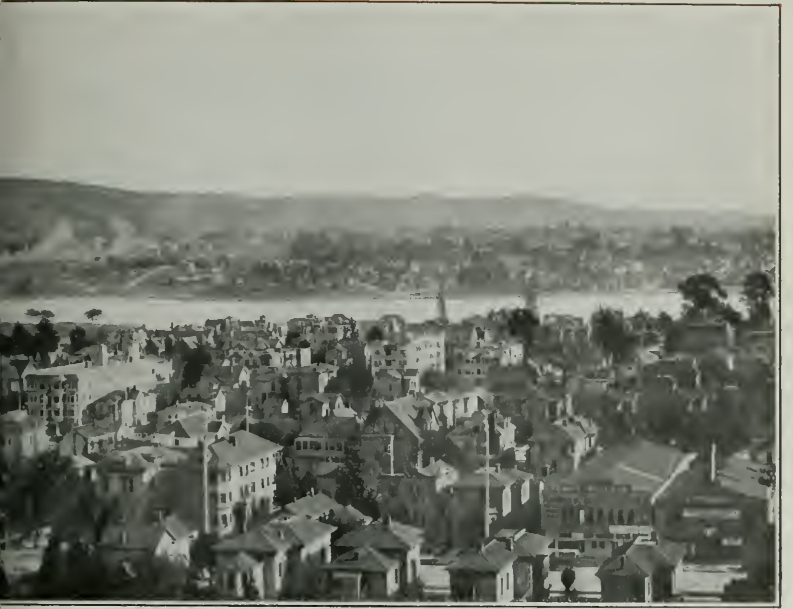
PANORAMA No. 2.



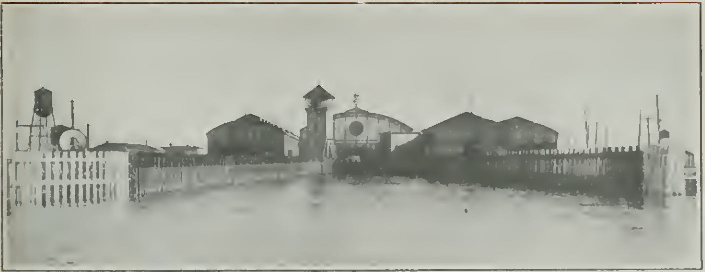
CONSTRUCTION work on new docks being built by the city of Oakland along the entire water front.

PANORAMA No. 4.

FREIGHT yards of the Southern Pacific and Western Pacific Railroad Companies, along the water front, West Oakland.



PANORAMA No. 3.

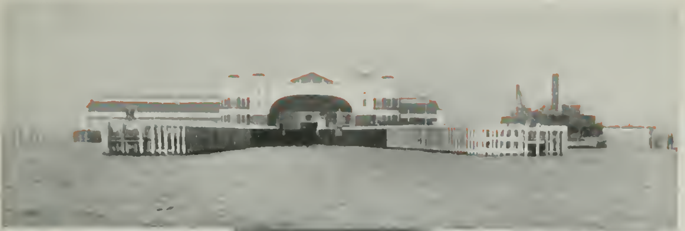


SOUTHERN Pacific passenger depot and mole on the Oakland side of San Francisco Bay.

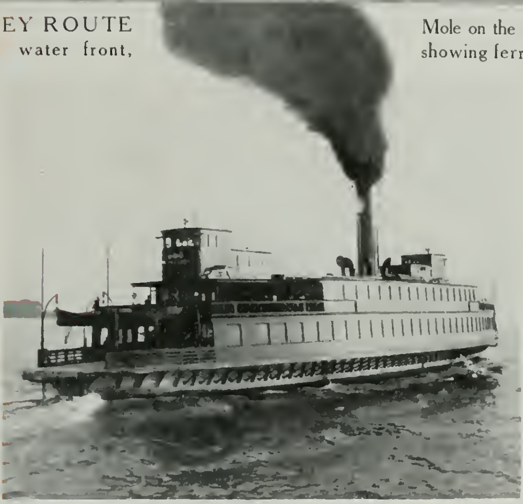
LAKE MERRITT from the 12th Street Bridge. This lake is located in practically the center of Oakland, and a portion of the new boulevard which extends around the lake is shown on the right.

LONG WHARF, on Oakland water front. At this point trains receive their freight direct from deep sea vessels.

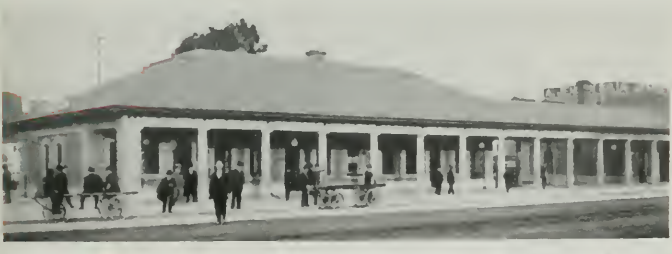
ONE of the trains of the San Francisco, Oakland and San Jose Railway Company, popularly known as the "Key Route."



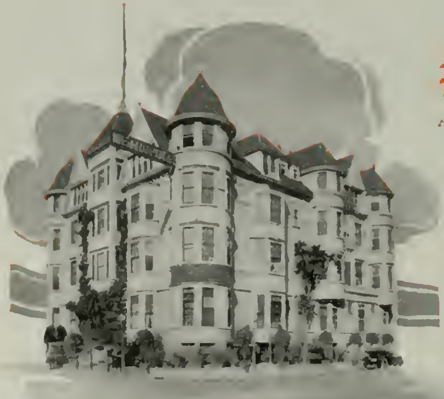
KEY ROUTE Mole on the Oakland water front, showing ferry slips.



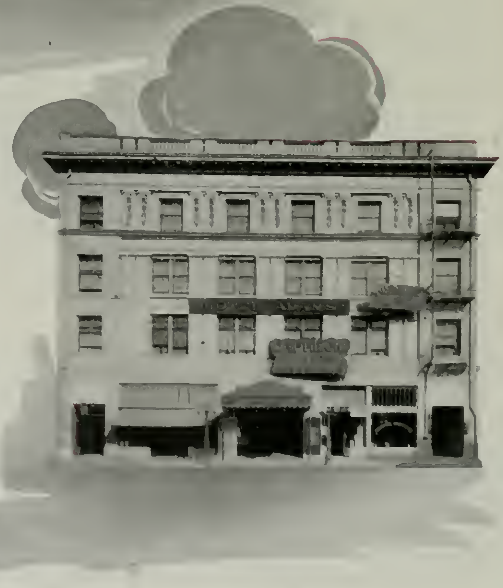
FERRY steamer "San Francisco" of the Key Route System, plying between Oakland and San Francisco.



NEW Southern Pacific depot, First and Broadway Streets.



HOTEL Metropole, 13th and Jefferson Streets. A first-class family hostelry.



HOTEL Adams, 12th Street. The Orpheum Theater conducting a first-class vaudeville show, occupies the ground floor.

ST. Mark's Hotel, 12th and Franklin Streets. A new, first-class fire-proof hotel building, patronized particularly by traveling men and tourists.

MADISON PARK Apartments, 9th and Madison Streets.

SECURITY Bank and Trust Company Building, in course of construction, 11th and Broadway.

HOTEL ATHENS, Broadway. A commercial hotel of the first class.

Y. M. C. A., Building, 21st and Telegraph Avenue.

PRIVATE grounds surrounding the home of Mr. A. Schilling, on the shores of Lake Merritt.

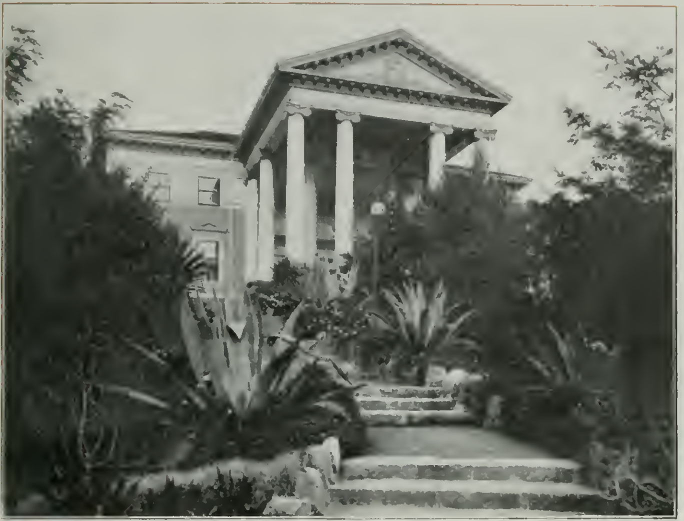
PROVIDENCE Hospital, Broadway and 26th Streets. This is a general hospital conducted by the Sisters of Mercy.

NILE CLUB. 13th Street.

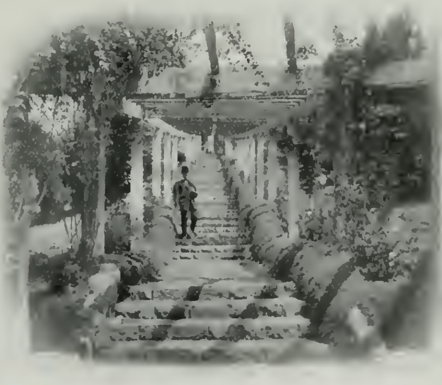
OAKLAND Public Library in 14th Street.

COLLEGE of Engineering of the Oakland Polytechnic Business College, 13th and Madison Streets.

SAMUEL MERRITT Hospital, Hawthorne and Webster Streets. Established, and maintained through a trust fund bequeathed by Dr. Samuel Merritt, who was one of Oakland's leading physicians.



MAIN entrance to Home Club, Cottage and 4th Avenue. This structure is a beautiful building on an elevated knoll, reached through what is considered one of the most beautifully laid out and arranged pergolas in the west.

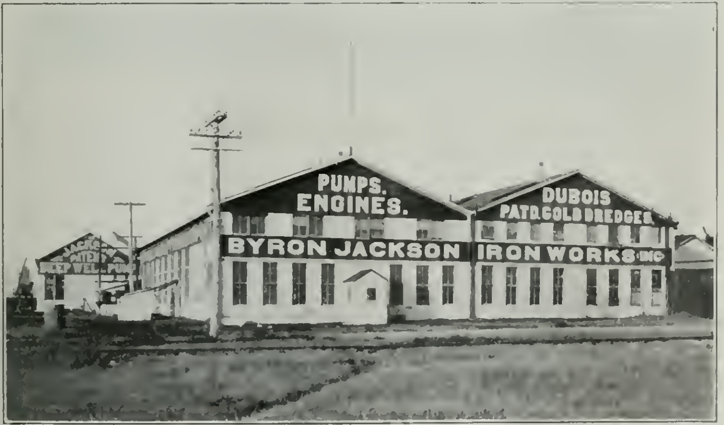


PERGOLA, main entrance way to the Home Club.

INTERIOR of the C
is the largest institut

CALIFORNIA Motor Car Company's new factory, Fruitvale District, Oakland. This concern is now manufacturing automobiles on a large scale.

otton Mills, Oakland. This
h line on the Pacific Coast.

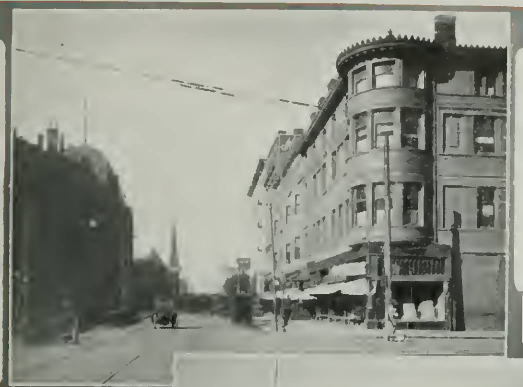


BYRON Jackson Iron works, one of the numerous iron manufacturing plants in Oakland.

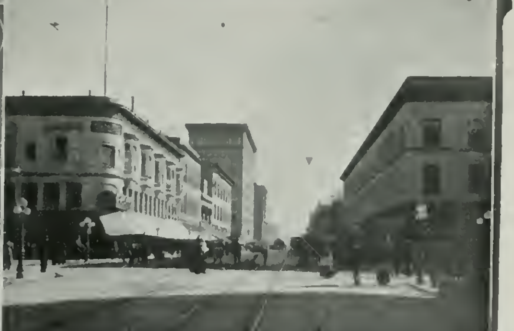
ST. Francis de Sales Church,
21st and Grove Streets.

THE McElroy Memorial fountain in Lakeside Park, on the shores of Lake Merritt.

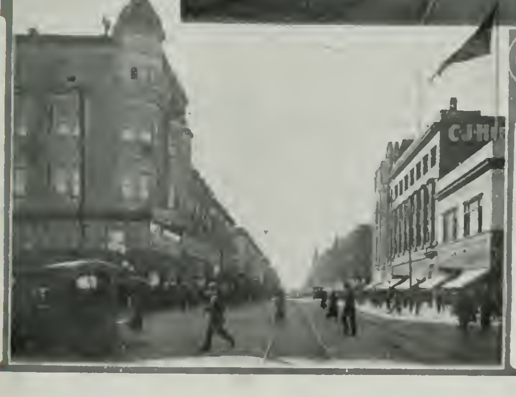
UNITARIAN Church,
14th and Castro Streets.



14TH Street looking west from Franklin Street. Athenian Club building in right foreground.



TWELFTH Street looking east from Washington. On the left is Kahn Bros. store and the Oakland Bank of Savings.



WASHINGton Street, south from 13th. In left foreground is building occupied by Abrahamson Bros. and on the right the store of C. J. Heesman.

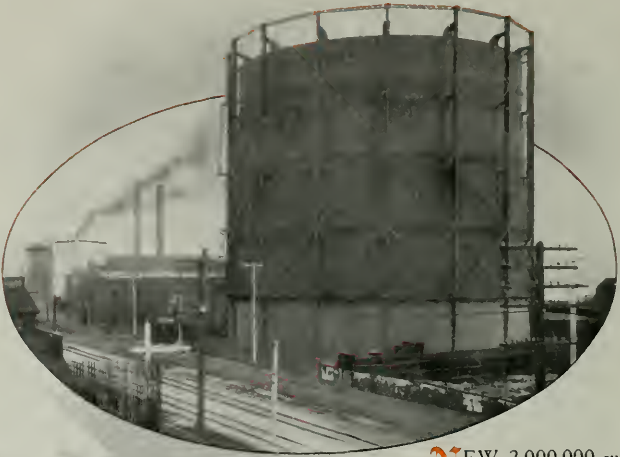
14TH Street looking east from Washington.

TAFT & Pennoyer Building, Clay at 14th Streets.

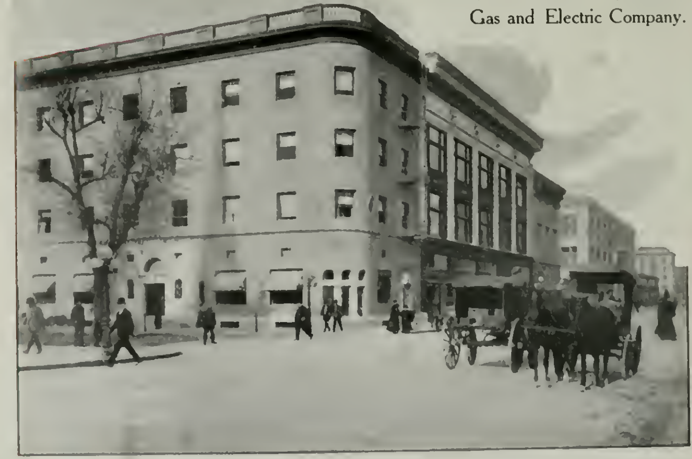
BROADway north from 11th. On the right are shown the Security Bank and Trust Co.; Oakland Bank of Savings; Union Savings Bank and Syndicate buildings. On the left the First National Bank.

SUB-STATION "H," Pacific Gas and Electric Company, East Oakland, wherein the 60,000 voltage coming in over the main lines is stepped down to meet the requirements of the local distribution system.

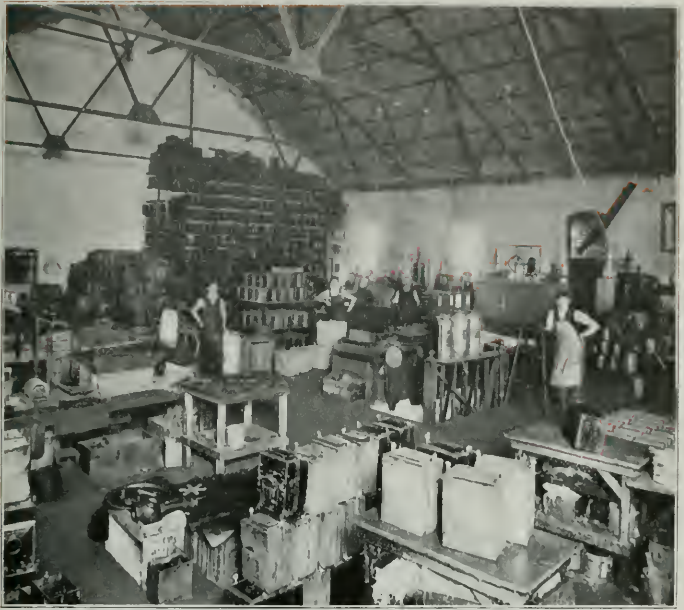
RIDGE Sub-station, near the crest of the hills back of Berkeley. A transformer station on the main 60,000 volt Lines of the Pacific Gas and Electric Company.



NEW 2,000,000 cu. ft. gas holder. To the left is shown electric stations "A" and "B," and new turbine station "C," Pacific Gas and Electric Company.

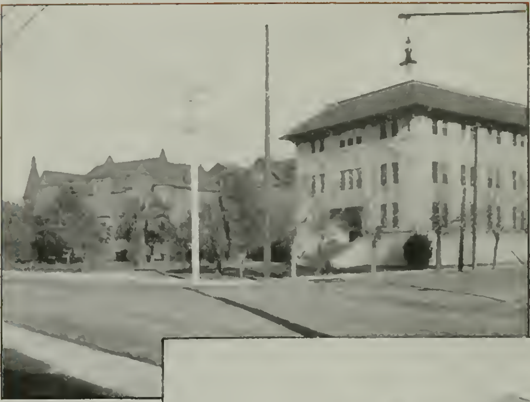


GENERAL Office Building of Oakland District, Pacific Gas and Electric Company, in 13th and Clay Streets. To the right is shown the Jackson Furniture Company, and on the corner, Sherman, Clay & Co.

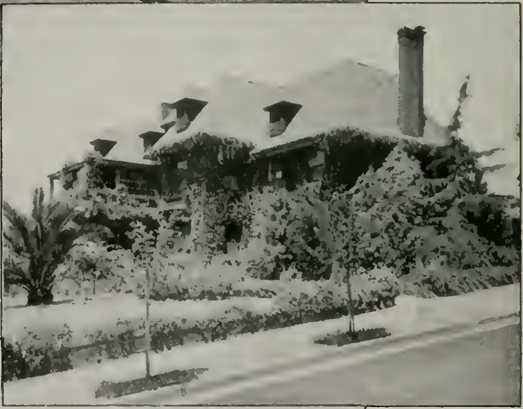


INTERIOR of storage battery room, Temescal Sub-station, Oakland District, Pacific Gas and Electric Company. These storage batteries are used as a reserve in case of interruption in service on the main lines.

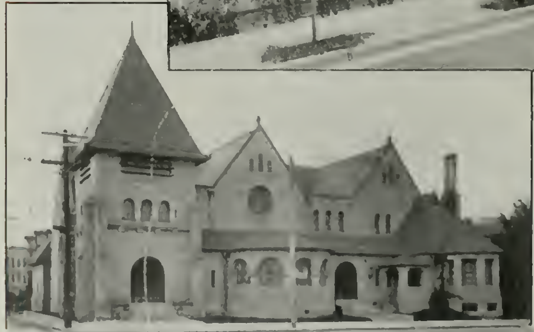
INTERIOR of Meter Shop, operated by the Oakland District, Pacific Gas and Electric Company.



FABIOLA Hospital, Moss Ave. and New Broadway. This hospital is conducted by and financed through the efforts of the philanthropic women of Oakland.



THE home of Mr. Wickham Havens in Piedmont.



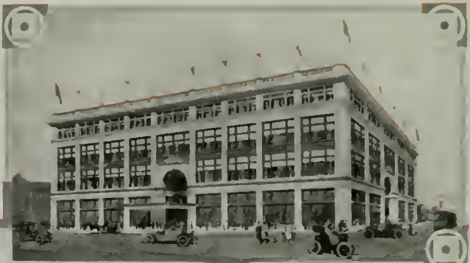
CHRISTIAN Science Church, 17th and Franklin Streets.

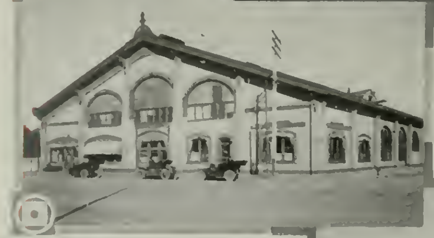
THE Claremont Country Club, in foothill district of Oakland.

KEY Route Inn, a hotel in the residential section of Oakland, and in which is constructed one of the depots of the Key Route Electric Railway System.

GRANT School, representative of Oakland's' thirty-six Grammar School buildings.

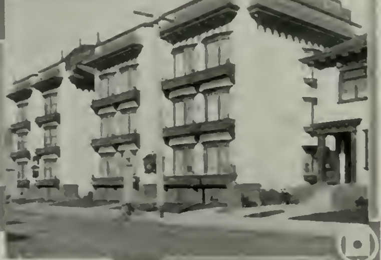
THE Department Store of the H. C. Capwell Company, Clay and Fourteenth Streets.

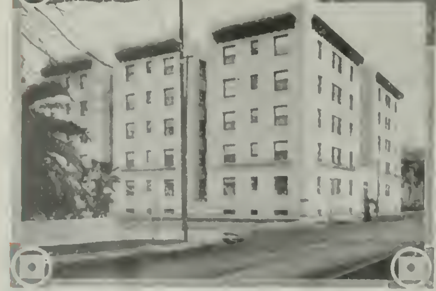




GENERAL Offices of the Oakland Traction Company, operating electric railway lines throughout Oakland, Alameda, Berkeley and suburbs north and south.

FREDERICK Apartments 41st near Telegraph Ave. A new up-to-date apartment dwelling in the residential district.





PERALTA Apartments 13th and Jackson Sts. An apartment hotel, first-class in every appointment, recently erected in the residence district of Oakland.

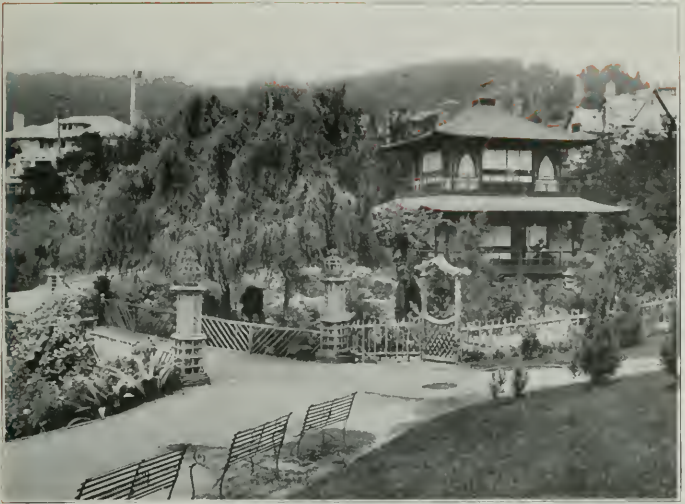
DEPOT of the Santa Fe Railway Company, Oakland.

THE palatial residence in Claremont Park, recently constructed for Mr. H. H. Hart. This gives a fair idea of the numerous magnificent residences in the foothills back of Oakland. Many wealthy people have been drawn to this section by perfect climatic conditions.

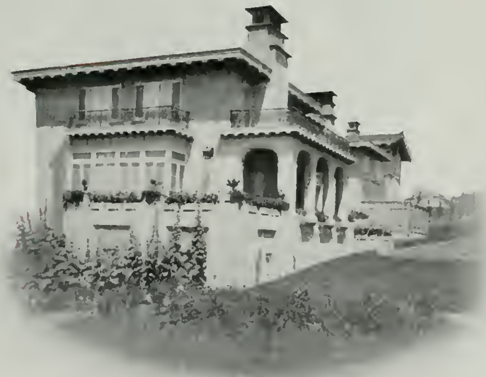
THE new depot of the Western Pacific Railway Company 3rd Street between Washington and Broadway. This transcontinental road has only recently reached the Coast.

FIRST BAPTIST Church, Telegraph Ave. and Jones Street.

NEW United States Post Office Building, near gore of Telegraph Ave. and Broadway.



TEA House in park at Piedmont Springs, in the foothill district of Oakland.



RESIDENCE of Mrs. James Moffitt, Piedmont.

CLAREMONT Hotel, Claremont Park, located in the foothills back of Oakland.

HOTEL Oakland, occupying block bounded by 13th, 14th, Harrison and Alice Streets. This building, now nearing completion, will have 800 guest rooms, and will be palatial in every appointment.

VIEW of trolley line extending into the foothill residential section back of Oakland.

MAC DONOUGH building, 14th and Broadway, in which is located the MacDonough Theater.

THE Ebell Society, Harrison near 14th Street. One of the leading women's clubs in the State.

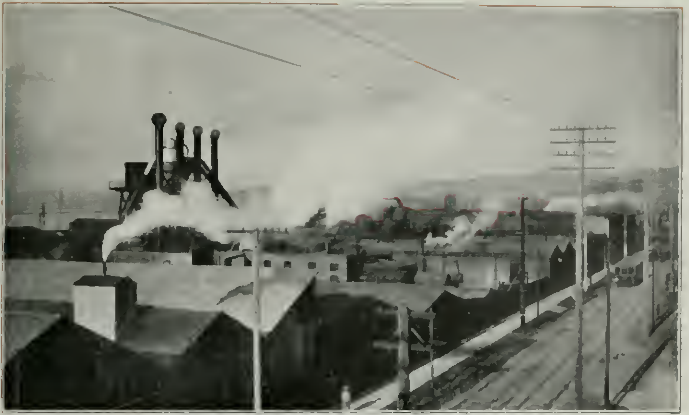
OAKLAND High School, situated in block bounded by 11th and 12th, Grove and Jefferson Sts.

ST. Mary's College, New Broadway.

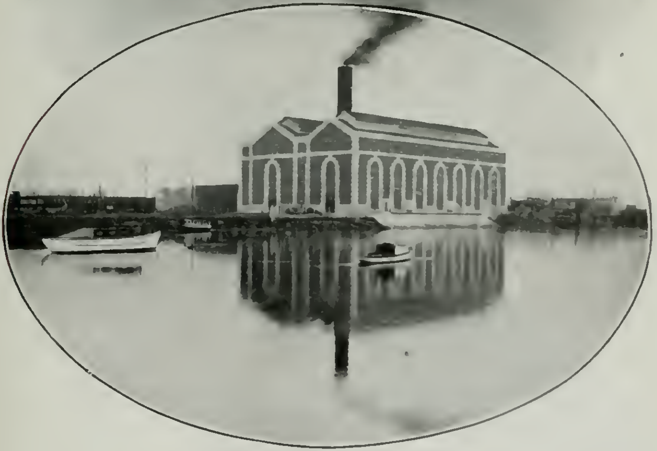
THE home of F. M. Smith. The grounds surrounding this property are conceded to be among the most beautiful on the Coast.

A Comfortable representative residence in Highland Avenue.

EAST BAY Sanitorium, Telegraph Avenue, a privately conducted hospital.



CALIFORNIA Door Company, West Oakland, one of the largest woodworking concerns in the West.



THE Electric Generating Station of the Southern Pacific Company. This station has just been completed to care for the new electric interurban lines recently placed in operation.

PLANTS and warehouses of the Griffin Skelly Company, Waterhouse & Lester, and the Judson Manufacturing Company

INTERIOR of the mole depot of the Key Route System, where passengesr are transferred to ferries for San Francisco.

PHOENIX Iron Works.

OAKLAND Warehouse Company. This is the western depot and factory of the Incandescent electric lamp manufacturers.

Domestic Science Lessons

By MRS. H. ROSE STEWART.

LESSON V.

CAKES, COOKIES AND FROSTINGS

ENGLISH XMAS CAKE

1 lb. butter
1 lb. flour
1 lb. raisins
1 lb. sultana raisins
1 lb. sugar
¼ lb. almonds
¼ lb. candied peel
1 wineglass brandy
1 teaspoon mixed pudding spice
1 small teaspoon carbonate of soda
8 or 9 eggs
1 lb. currants

Beat the butter and sugar to a cream, beat in another basin the eggs till light, have ready the fruit, blanch and chop the almonds, shred the peel, now add to the butter, etc., eggs, flour, fruit alternating till all is used mixing well, add then the brandy, spice and soda, pour the mixture into a buttered and lined cake tin, and bake in a moderate oven over three hours.

ALMOND ICING FOR ENGLISH XMAS CAKE

½ lb. almonds
1 lb. icing sugar
Yolks of 2 eggs
Juice of ½ lemon or a little orange flower water

Blanch and chop the almonds and put them through a meat mincer, adding from time to time a little sugar to prevent them oiling. Mix in the sugar, the yolks of eggs and lemon juice. Knead all together and use.

WHITE SUGAR ICING

¾ lb. icing sugar
Juice of 1 lemon
White of 1 egg

Sift the sugar, beat in the egg, then add lemon juice, beat until quite white. Spread in cake with knife, which may be dipped in cold water from time to time in order to make the icing smooth, put in a dry place to set. A rose tube may be used to ornament cake.

SULTANA RAISIN CAKE

½ lb. flour
¼ lb. butter
¼ lb. sugar
¼ lb. sultana raisins
2 teaspoons baking powder
Grated rind of 1 lemon
1 oz. citron
½ gill milk
2 eggs

Rub together the flour, sugar and butter, add then the baking powder, sultanas, and citron and lemon rind. Beat the eggs until light, add to them the milk, mix all together, bake one hour.

SHREWSBURY COOKIES

¼ lb. flour
1 oz. rice flour
3 oz. butter
2 oz. sugar
1 egg
A few drops of vanilla
A few currants
A little grated lemon rind

Cream butter and sugar, then add alternately the beaten egg and flour, roll out thinly, cut into rounds, and bake almost seven minutes in moderate oven.

CARAWAY SEED CAKE

½ lb. flour
¼ lb. sugar
¼ lb. butter
2 tablespoons milk
2 eggs
1 teaspoon baking powder
1 oz. citron
1 oz. grated lemon peel

First take flour, sugar and butter, work with hands, then add baking powder, seeds and citron peel. In separate dish beat the eggs, then add to them the milk, pour this into the mixture, mix all together, and bake in buttered tin one hour.

CHOCOLATE CREAM LAYER CAKE

Cake Part—Cream a half a cup of butter, add one and one-quarter cups of sugar and mix in alternately half a cup of water and two cups of pastry flour sifted three times with two teaspoonfuls of baking powder. Beat well, flavor with a teaspoonful of vanilla, and add the stiffly beaten whites of five eggs. Bake in two layers.

Filling—Whip one pint of cream until stiff. Melt two squares of chocolate and add half a cup of sugar, and half a cup of whipped cream. Sweeten, flavor with a half teaspoonful of vanilla, and set aside, mixing the balance with the cool chocolate. Spread between the layers of the cake and decorate with the cream that was put aside.

DEVIL'S FOOD CAKE

Mix half a cake of chocolate grated with half a cup of milk, one egg yolk, and one cup of granulated sugar. Boil until the sugar and chocolate are dissolved. Take it off the stove, add one teaspoonful of vanilla, and let it cool while mixing the cake.

Cake Part—

1 cup of powdered sugar
½ cup of butter
½ cup of milk
2 eggs well beaten
2 cups of flour
2 teaspoonfuls of baking powder

Mix the cake into batter and add the chocolate mixture and bake in two round tins. In this recipe, the butter and sugar must be well creamed, and the flour and sugar sifted before measuring. When the cake is cold ice it with the following:

Caramel Filling—

4 cups of brown sugar
1 cup of milk
⅓ of a cup of butter

Cook about as long as for fudge, until it almost hairs.

SUGAR COOKIES

⅔ of a cup of butter
⅔ of a cup of sugar
2 eggs
4 tablespoonfuls of milk
2 teaspoonfuls of vanilla
½ a teaspoonful of soda
1 teaspoonful of cream of tartar

Add flour enough to roll and sugar on the top after rolling.

EVERYDAY FRUIT CAKE

1 heaping cup of butter and lard
2 cups sugar
2 teaspoons of soda, dissolved in 2 cups of sour milk
3 or 4 cups of fruit (currants or raisins rolled in flour before adding to batter to prevent settling
1 egg
1 teaspoonful of baking powder
1 tablespoon cinnamon
1 tablespoon allspice
1 tablespoon nutmeg
¼ teaspoon cloves
Add extracts if wished

This recipe will make three cakes, and is fine baked in layers. Good at any time and will keep indefinitely.

WATERMELON CAKE

White Part—

2 cups white sugar
⅔ cup sweet milk
Whites of 5 eggs
⅔ cup butter
3 cups flour
2½ teaspoons baking powder

Red Part—

Yolks of 5 eggs
⅓ cup butter
1 cup of bright red sugar
⅓ cup of sweet milk
2 cups of flour
2½ teaspoons of baking powder
1½ lbs. seeded raisins well dredged in flour

Put the red batter in the center of the pan and pour the white around the outside of the red part. A cup of blanched almonds may be cut in half and stirred into the red part with good effect.

WALNUT LOAF CAKE

Ingredients—

- ½ cup butter
- 2 cups sugar
- 3 cups flour
- 1 cup of milk
- 4 eggs
- 1 cup (finely chopped) walnuts
- 3 level teaspoons baking powder
- 1 teaspoon vanilla
- 1 teaspoon lemon extract

Rub the butter and one cup of sugar to a cream, beat yolks of eggs until light, add to this the other cup of sugar, then put the two together and add flavoring. Sift baking powder with the flour, reserving a little of the latter to mix with the cup of chopped walnuts. Mix flour and milk alternately, then the chopped walnuts, and lastly the whites of the eggs. Bake about one hour.

Icing—

Boil 1 cup of sugar with 4 tablespoons of water, add this to the white on 1 egg, beaten

AN EMERGENCY CAKE

- 2 cups of sugar
- ½ cup thick sour cream
- 1 cup milk
- 3½ cups flour
- 1 egg

Beat sugar with cream, to which a pinch of soda has been added, then add beaten egg and cup of milk; then flour, to which 2 teaspoons of baking powder have been added, flavor to taste. Put in jelly tins and bake in quick oven.

A CHEAP PRUNE CAKE

- ½ cup of butter
- 2 cups brown sugar
- 2 eggs
- 1½ cups milk
- 4 cups flour
- 3 teaspoons baking powder
- 1 tablespoonful ginger
- 1 teaspoon ground cloves
- 2 teaspoons cinnamon
- 2 cups prunes

Cream together butter and sugar, add eggs well beaten, then milk, spices and flour.

TO PREPARE PRUNES

Put in stewpan with cold water, bring to a boil, drain, then take out pits and chop in bowl. Flour well before adding to batter. Currants and citron may be added if cared for.

GERMAN CAKE

- 1½ cups flour
- Salt
- 2 tablespoons sugar
- 1 heaping spoon baking powder

Mix into a soft dough, but do not knead. Spread layers of apples or peaches or plums. Sprinkle sugar, cinnamon and bits of butter. Bake slowly 25 minutes. Almost any kind of fruit can be used, and it is very nice and simple to make.

FILLINGS AND ICINGS FOR CAKES

CUSTARD

- 2 cups sugar
- 3 cups milk
- 3 heaping tablespoons corn-starch
- Yolk 5 eggs
- 1 tablespoon butter
- 2 teaspoons vanilla extract

Scald milk in double boiler, add corn-starch dissolved in little milk, stir until smooth. Add sugar, cook 10 minutes. Add egg yolks, cook 4 minutes, take off and add vanilla.

CREAM FILLING

- 2 cups milk
- 2 eggs
- 3 tablespoons corn-starch
- 1 cup sugar
- Flavoring

Cook as above.

CREAM FILLING NO. TWO

- 1 cup thick cream, whipped to a solid froth
- ½ cup powdered sugar
- 1 teaspoon extract vanilla

Mix lightly together and use at once.

FIG FILLING

- ½ lb. chopped figs
- 2 tablespoons sugar
- 3 tablespoons boiling water
- 1 tablespoon lemon juice

Cook in double boiler until thick enough.

ORANGE FILLING

As lemon filling, using one-half cup sugar and oranges instead of lemons.

LEMON FILLING

Grated rind 2 lemons, their strained juice
2 cups sugar
Whites of 2 eggs
1 cup boiling water
2 tablespoons flour mixed with cold water
1 tablespoon melted butter

Cook together in double boiler, adding beaten whites last.

CHOCOLATE FILLING

¼ cake chocolate, grated
½ cup milk
Yolk of 1 egg
1 cup sugar
1 teaspoon extract vanilla

Boil sugar, chocolate, and milk together till thickened, add egg yolk, cook 2 minutes, take from fire, add vanilla.

CHOCOLATE TRANSPARENT ICING

Melt 3 ounces fine chocolate with small quantity water in pan over fire (stirring constantly) until it becomes soft. Dilute this with one-half gill of syrup, work until perfectly smooth. Then add to boiled sugar as above.

WHITE ICING

The whites of 4 eggs
1½ lbs. white sugar dust
Juice of ½ lemon
¼ oz. extract rose

Place the whites and the sugar in a bowl with the juice and extract. Heat with a wooden spoon until, letting same run from the spoon, it maintains the thread-like appearance for several minutes, when use as directed.

CHOCOLATE CREAM FILLING

½ cake chocolate, grated
⅔ cup milk
½ cup sugar
1 tablespoon butter
Pinch salt
1 teaspoon extract vanilla

Boil gently until thick.

COCOANUT FILLING

To custard, add 2 cups freshly grated cocoanut.

FRUIT FILLING

4 tablespoons finely chopped citron
Same of chopped raisins
½ cup chopped blanched almonds
¼ lb. chopped figs
Whipped whites 3 eggs
½ cup sugar

Whip whites with sugar, add fruits, and beat well.

PRUNE AND NUT FILLING

Soak ½ lb. large prunes over night. Steam until plump and soft. Remove pits. When cold add ½ cup chopped blanched almonds and stir into this whites of 3 eggs, beaten stiff, with ½ cup powdered sugar.

CLEAR ICING FOR CAKE

Put 1 cup sugar in a bowl with a tablespoon lemon juice and whites of 2 eggs. Mix together smooth and pour over the cake; if the cake is not hot enough to dry it, place it in the mouth of a moderately warm oven.

BOILED ICING

Boil 1 cup granulated sugar with ½ cup water till it ropes when dropped from fork. Pour gradually over stiffly whipped whites of 2 eggs, beating hard. Add flavoring and use at once.

TRANSPARENT ICING

Place 1 pound pulverized white sugar in saucepan with ½ pint water. Boil to consistency of mucilage, then rub sugar with wooden spatula against sides of pan until it assumes white, milky appearances. Stir in 2 tablespoons extract vanilla; mix well together. Pour this while hot over top of cake so as to completely cover it.

BAKER'S SOFT ICING

Boil 2 cups granulated sugar with 1 cup water without stirring till it ropes when dropped from fork. Take quickly from fire, let stand untouched till blood-warm. Beat till thick as soft dough, take in hands and kneead till soft, smooth, and creamy. Pack in covered glass and keep in cold place. To use, put some in bowl, set in hot water, stir constantly till soft enough to spread. Flavor and use. Will keep indefinitely.

CHOCOLATE WATER ICING

Melt 3 ounces fine chocolate in a few spoons water until creamy. Boil 2 cups granulated sugar with 1 cup water without stirring till it can be rolled in soft ball between fingers in cold water. Take from fire, stir for a moment till it becomes slightly cloudy. Add chocolate and use at once on cake.

PLAIN ICING

Whip white 1 egg till frothy. Add 1 teaspoon cold water, then 1 tablespoon at a time, sufficient sifted confectioner's sugar to make stiff enough to spread. Flavor as desired.

ROYAL ICING

Put whites 2 eggs in a bowl, add 1 tablespoon sifted confectioner's sugar, beat 3 minutes. Add another tablespoon sugar, beat again, continue till icing is very stiff and glossy, adding 1 teaspoon lemon juice. Spread on cake, let stand till dry.

WATER ICING

To 2 tablespoons boiling water add enough confectioner's sugar to make thick enough to spread. Add any flavoring desired.

MAPLE SUGAR FROSTING

Boil ½ pound broken maple sugar with 3 tablespoons water till dissolved and thick enough to rope when dropped from fork. Pour gradually on whipped whites of 2 eggs. Beat till thick enough to spread.

MARSHMALLOW FROSTING

Heat 2 tablespoons milk and 6 tablespoons sugar over fire; boil 6 minutes without stirring. In double boiler heat ¼ pound cut marshmallows. When very soft add 2 tablespoons boiling water, cook till smooth. Beat in hot sugar, keep beating till partly cool, add ½ teaspoon extract vanilla. Use at once.

WHY CAKES OFTEN FAIL

Because inferior ingredients are used, such as rancid butter, inferior sugar, damp flour, and doubtful eggs. Because either the butter is insufficiently beaten with the sugar or rubbed into the flour, or the eggs are not beaten enough. Because the mixture is beaten after the flour is added, whereas all that should be done before. The management of the oven is not understood, and the cakes are either too dark or too pale. Because the cakes are not carefully tested to make sure that they are cooked. The cakes are either left in the tin or put flat on the table to cool, whereas they should be placed on a sieve or tilted up against something so that the steam can easily escape.

When about to cut new bread or cake, heat the knife very hot; this will prevent its crumbling.

CAKES

FLOUR

Fancy-cake makers and confectioners prefer to use "pastry" flour for the making of cakes and pastry, which is a flour of different grade from that used for bread and general baking purposes. Bread flour contains a large proportion of gluten, the nitrogenous property of the wheat grain, which gives bone and muscle, and makes bread a nutritious food. When bread flour is used for cake and pie crust, the result is not quite as flaky and light as it should be, because of the gluten in the flour. A special sack of pastry flour for use in making fine cakes and pastry will be advantageous. In appearance, pastry flour is whiter than bread flour. When rubbed between the fingers it feels as soft and fine as corn-starch, if squeezed in the hand it forms a firm ball. Because of this tendency to "pack" it should always be sifted very thoroughly.

TO MIX CAKES CONTAINING BUTTER

Cream the butter, beating till light. Gradually add the sugar, beating till light and creamy. Add the yolks of eggs beaten till light, then the flavoring. Beat in alternately the liquid and flour, the latter mixed with salt and baking powder. Lastly, add the beaten whites, and fruit, if used.

TO MIX CAKES CONTAINING NO BUTTER

Beat the egg yolks until very light and thick. Add the sugar gradually, beating till very light and spongy. Add the flavoring and liquid, if used. Have the whites of eggs whipped to a stiff froth. Add them alternately with the sifted flour (mixed with baking powder), and cut both in very lightly and quickly.

TO BAKE CAKES

Thin cakes need a hotter oven than loaf cakes. Cakes without butter (sponge cakes) should have a more moderate, longer baking than cakes of same size containing butter. The process of baking may be divided into four periods or quarters of time: in the first quarter the cake begins to rise; in second quarter it is still rising and begins to color; in third quarter it browns all over; in last quarter it shrinks from sides of pan.

To test, insert a clean broom-straw into the middle of the cake; if it comes out clean, the cake is done. Hold the pan to the ear; it should scarcely "sing."

Line loaf-cake pans with buttered paper; fruit cakes need several thicknesses of the same.

There is always room at the top—just under a man's hat.

Don't pray for things you are not willing to work for.

It doesn't take much to satisfy the man who is satisfied with himself.

"A job done well is a job done cheap."

Baseball News

The large companies and corporations in other cities throughout the country have their "crack-a-jack" baseball teams. Why not the Pacific Gas and Electric Company. We have the players, and a good team once organized will not be without its followers. Now you baseball enthusiasts, GET BUSY ! !

The proper plan would be to have twelve members on the team, and the Company would surely be well represented on the diamond with an aggregation selected from the following players:

Murphy
Fitzhenry
Swan
Mensing
Hall
Barthol
Dougherty
Scanlon
Barieau
Wrinkle
Steele
Crowley
Melbourne
Oretga
Feeney
Frank Trowbridge
Hale
Coghlan
Heffernan
Rogers
Al. Trowbridge

Of course, the "unknowns" are requested to make their appearance along with the ones mentioned.

In the January issue of the MAGAZINE will appear a date for meeting, at which time a captain and manager will be elected and a schedule for the coming season arranged. In preparing the schedule, games will be sought with thirty or forty of the strongest amateur and semi-professional teams in this section of the State.

M. MENSING.

There was a man in our town,
  And he was wondrous wise,
He could unscramble scrambled eggs,
  And uncuss custard pies.
He could unbutton butter, too,
  But, with all his skill,
There was on thing he could not do—
  Unpay a paid gas bill.

C. H. C., Oakland District.

Life indeed must always be a compromise between common sense and the ideal—the one abating nothing of its demands, the other accommodating itself to what is practicable and real.

PERSONALS

Announcement has been made of the engagement of James Driscoll and Miss Emily Lally, both employees of the Pacific Gas and Electric Company. Mr. Driscoll is in the Cashier's Department, and Miss Lally has resigned her position in the Bureau of Bookkeeping to take up the more serious duties of married life. They say that marriages are made in heaven, but the Celestial Matrimonial Clerk must look to his laurels, for there is something doing all the time in that line within the Company's own confines. The Driscoll-Lally event will make no less than the fifteenth of the same kind that have been evolved in the Company's "Garden of Love" in the last two years. The count is not complete as yet, there being several more precincts to hear from. The wedding will take place some time in the middle of January, 1912, and the many associates of the young couple express best wishes for a life of happiness and prosperity.

A very agreeable surprise was afforded the employees of the Company when it became known that Mr. Kendall I. Dazey, in the Treasurer's Department, 445 Sutter Street, had entered the bonds of matrimony on Christmas day. The happy event was performed at the home of the bride, Miss Minnie Jane Irving, 3653 Seventeenth Street.

May there be many years of happiness in store for the bride. Congratulations are extended to the groom.

On December 16th, at Nevada City, Mr. Carl H. Becker, machinist and electrician at Colgate Power House, was married to Miss Hazel Miller of Montezuma Hill. Mr. and Mrs. Becker will occupy a cottage at Colgate after December 27th.

Mr. A. F. Hockenbeamer, Treasurer and Comptroller of the Company, who has been in the East for several weeks, is expected home very shortly.

Lucky Jim

By EUGENE A. BEAUCE

There is grief and gloom in Gasville,
  Miss Lally leaves today,
She goes to wed James Driscoll,
  She could not say him nay.
Lucky Jim! How we envy him.

There are disappointed suitors
  Who fill the air with sighs,
For Jim just put one over,
  And carried off the prize.
Lucky Jim! Our chances they were slim.

Nobody guessed the secret,
  But it leaked out somehow,
And we are going to lose her,
  We're surely done for now.
Lucky Jim! Tears our eyes bedim.

A girl of class is Emily
  Her manner gentle, kind,
In every heart in Gasville,
  Her image was enshrined.
Lucky Jim! The best things come to him.

So here's a toast we'll drink to,
  "Let no more tears be shed,
We grieve to lose 'Our Emily,'
  We're glad to see her wed
Lucky Jim! God is good to him."

Notice has just been received from the office of the President, that beginning with Monday, January 8th, 1912, the Publicity Department will be re-organized with Mr. Fred S. Myrtle as Manager.

Mr. Myrtle will also have full charge of the Company magazine. Mr. Myrtle has for years been connected with the San Francisco daily papers, and recently with the San Francisco *Examiner*.

PACIFIC GAS AND ELECTRIC COMPANY

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F. B. Anderson
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John A. Britton
W. H. Crocker
E. J. De Sabla, Jr.
F. G. Drum
John S. Drum
D. H. Foote
A. F. Hockenbeamer
John Martin
Louis Monteagle
Cyrus Peirce
Louis Sloss
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Antioch	Antioch	F. J. Southerland	Petaluma	Petaluma	H. Weber
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Chico	Chico	H. B. Heryford	Redwood	Redwood City	E. W. Florence
Colusa	Colusa	L. H. Hartsock	Sacramento	Sacramento	C. W. McKillip
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Marysville	Marysville	J. E. Poingdestre	Solano	Dixon	C. E. Sedgwick
Marin	San Rafael	W. H. Foster	Stanislaus	Newman	W. A. Widenmann
Napa	Napa	O. E. Clark	Vallejo	Vallejo	A. J. Stephens
Nevada City	Nevada City	John Werry	Woodland	Woodland	W. E. Osborn

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Electra	W. E. Eskew	San Jose	J. O. Hansen
Marysville	C. E. Young	South Tower	A. H Burnett
Nevada	George Scarfe	Stockton	E. C. Monahan
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San Jose	R. H. Hargreaves		

SUPERINTENDENTS OF GAS DISTRIBUTION

Oakland	George Kirk	San Francisco	W. R Morgan

PACIFIC GAS AND ELECTRIC COMPANY

CITIES AND TOWNS SUPPLIED WITH GAS, ELECTRICITY, WATER AND RAILWAY

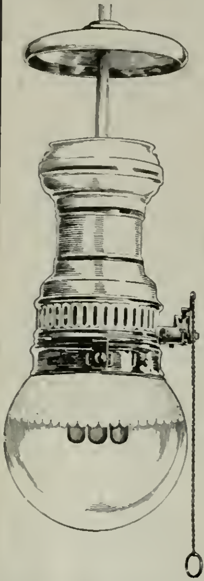
Service Furnished	Number of Towns	Total Population
Electricity	162	1,049,977
Gas	49	978,167
Water	10	45,825
Railway	1	60,000

Place	Population	Place	Population	Place	Population
Alta	20	[1] Fresno	30,000	Pinole	1,500
[1] Alameda	25,000	[2] Fair Oaks	250	Pittsburg	2,372
[2] Albany	800	Folsom	1,800	Pleasanton	2,000
Amador City	200	Glen Ellen	500	Point San Pedro	20
Adams John	25	[3] Grass Valley	4,500	Port Costa	6060
Alto	25	Gridley	1,800	[2] Redwood City	3,200
[5] Auburn	2,375	Groveland	25	[2] Richmond	10,000
Agua Caliente	100	Guerneville	500	Rio Vista	884
Algarado	900	Hammonton	500	[5] Rocklin	1,000
Antioch	3,000	[2] Hayward	4,000	[5] Roseville	2,600
[2] Barber	500	[2] Hillsborough	1,000	Rodeo	500
[2] Belmont	350	Ignacio	100	[2] Ross	500
Belvedere	1,000	Ione	900	[4] Sacramento	60,000
Benicia	3,360	Irvington	1,000	San Andreas	200
[2] Beresford	25	Jackson Gate	20	[2] San Anselmo	1,500
[2] Berkeley	40,000	Jackson	2,035	[2] San Bruno	1,500
Biggs	750	Kennedy Flat	20	[2] San Carlos	100
Big Oak Flat	20	[2] Kentfield	250	[2] San Francisco	416,912
Brentwood	200	Knight's Landing	350	[2] San Jose	30,000
Broderick	200	Lake Francis	5	[2] San Leandro	4,000
Brown's Valley	50	Lathrop	300	San Lorenzo	100
Byron	200	Live Oak	200	[2] San Mateo	6,500
[2] Burlingame	4,000	Livermore	2,250	[2] San Quentin	2,500
California City	25	Los Gatos	3,000	[2] San Rafael	6,000
Campbell	600	Larkspur	600	San Pablo	1,000
Centerville	1,000	Lincoln	1,400	Santa Clara	6,000
Centerville	20	[2] Lomita	100	Saratoga	50
[2] Chico	13,000	Los Altos	500	[2] Santa Rosa	12,000
[2] Colma	3,500	[5] Loomis	400	[2] Sebastopol	1,200
[2] Colusa	1,500	Martinez	5,000	Sausalito	2,500
Concord	1,500	Martell	150	Smartsville	500
Cement	1,500	[2] Marysville	7,000	[2] South San Francisco	2,500
[5] Colfax	500	Mayfield	1,500	[2] Stanford University	2,600
Cordelia	150	[2] Menlo Park	1,500	Sonoma	1,200
Corde Madero	350	Meridian	300	Stege	1,000
Crockett	2,500	[2] Millbrae	300	[5] Stockton	30,000
Crow's Landing	375	Mill Valley	2,500	Suisun	1,200
Daly City	25	Mission San Jose	500	Sutter Creek	1,500
Davis	750	Mokelumne Hill	150	Sunnyvale	1,500
Decoto	350	Monte Rio	50	Tiburon	400
de Sabla	25	Mountain View	2,500	Tormey	20
[5] Dixon	1,000	Mare Island	500	Towle	100
Dobbins	50	[2] Napa	7,000	Tracy	1,200
Davenport	1,000	[2] Nevada City	2,700	Vacaville	1,200
Drytown	20	New Chicago	10	[2] Vallejo	15,000
Durham	500	Newark	700	Walnut Crek	350
Dutch Flat	500	[5] Newcastle	750	Warm Springs	200
[2] Easton	300	Newman	1,000	Wheatland	1,400
[2] East San Jose	1,660	Niles	800	Winters	1,200
Eagle's Nest	50	Novato	250	[2] Woodland	3,200
Elmira	150	[2] Oakland	230,000	Yolo	400
El Verano	400	[2] Palo Alto	6,300	[2] Yuba City	1,200
[2] Emeryvillo	5,000	Pacheco	200		
Encinal	100	Penryn	250	Total	1,104,977
Fairfield	834	[2] Petaluma	5,500		
Forestville	100	[2] Piedmont	1,720		

Unmarked—Electricity only.
1—Gas only.
2—Gas and Electricity.
3—Gas, Electricity and Water.
4—Gas, Electricity and Street Railways.
5—Electricity and Water.

EMPLOYS 4,500 people.
OPERATES 11 hydro-electric plants in the mountains.
4 steam-driven electric plants in big cities.
17 gas works.

SERVES ⅔ of California's population.
30 of California's 56 counties.
An area of 37,950 square miles.
⅗ the size of New York State.
1½ the size of all the New England States combined.



THE NEW

HUMPHREY 30

Inverted Gas Arc

The Best Lamp for Commercial Lighting ever presented to the Gas Industry .·. .·. .·.

A well known authority stated:

"That lamp is ten years ahead of the market. It will handle any and all conditions of gas."

Simplicity of construction, accessibility and durability of parts, low maintenance cost.

GENERAL GAS LIGHT CO.

SAN FRANCISCO KALAMAZOO NEW YORK

The Pacific Telephone and Telegraph Company

Good Service at Fair Rates

PACIFIC GAS AND ELECTRIC MAGAZINE

Published Monthly by
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO

VOL. 3 JANUARY, 1912 NO. 8

HAMMONTON SUBSTATION, NEAR MARYSVILLE

SAN FRANCISCO "1915" THE EXPOSITION CITY

ASSOCIATED OIL
COMPANY

GENERAL OFFICE
Wells Fargo Building
San Francisco

Telephone Kearny 4800

FOR SALE.

The Pacific Gas and Electric Company has for sale the following machinery:

ENGINES

MAKE	H.P.	COMPOUND	CYLINDER	STROKE	RPM	PRESSURE	FLY WHEEL.	CONDENSER
Ball	185	Tandem	12"-20"	16"	250	115 lbs.	74" D 15" F. Belt	Surface
Ball	350	Tandem	18"-28"	18"	208	120 lbs.	86" D 17" F. Belt	Surface
Ball	150	Cross	13"-22"	12"	300	125 lbs.	75" D 17" F. Belt	None
Hamilton-Corliss	450	Tandem	22⅜"-42⅞"	48"	75	110 lbs.	22' D 1½" Rope 14 Grooves	Surface
McIntosh-Seymour	400	Tandem	15"-30"	36"	136	155 lbs.	12' D 1¼" Rope 24 Grooves	Surface
Westinghouse	75	Cross Vertical	10"-14"	12"	350	125 lbs.	75" D 15½" F. Belt	None
Ball & Wood	700	Cross Vertical	21½"-45½	20"	150	155 lbs.	Direct conected to Gen. Elec. Co. Rev. Field Generator 500 K.W. 3 phase 2300 volts 60 cycles	Surface

BOILERS

One Heine Water Tube Boiler—200 HP., 135 lb. pressure, 87 tubes 3½" x 16'.

For further information and prices, kindly communicate direct with Mr. GEO. C. ROBB, Superintendent of Supplies, 445 Sutter Street, San Francisco.

Pacific Gas and Electric Magazine

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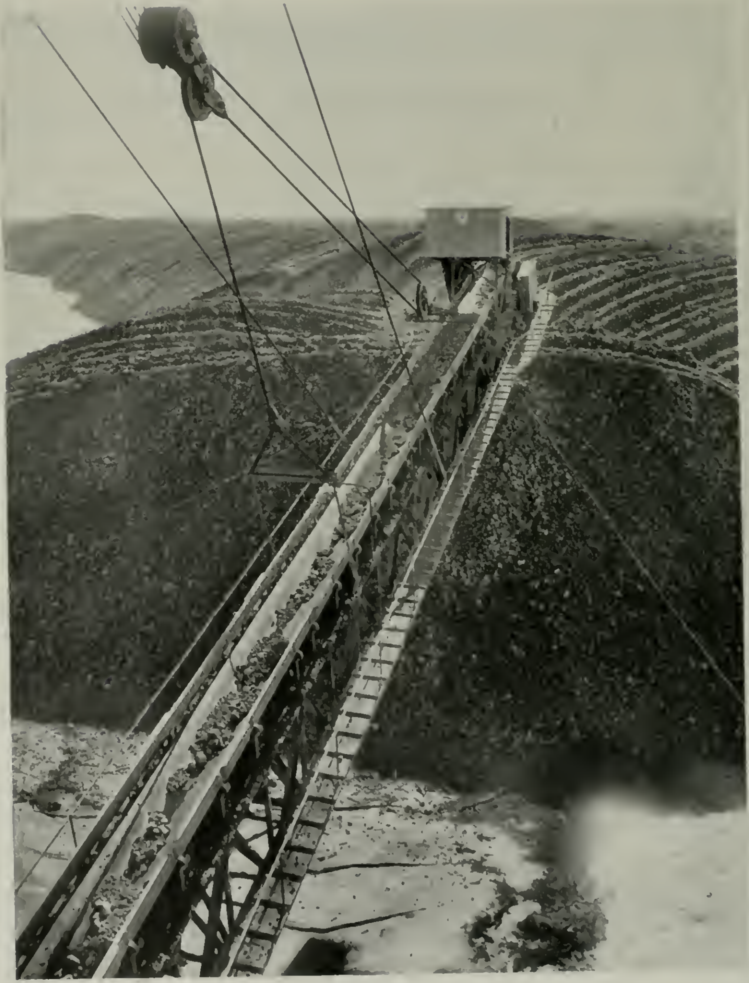

Gold Dredging. After the gold has been sifted out. The sea of cobbles.

PACIFIC GAS AND ELECTRIC MAGAZINE

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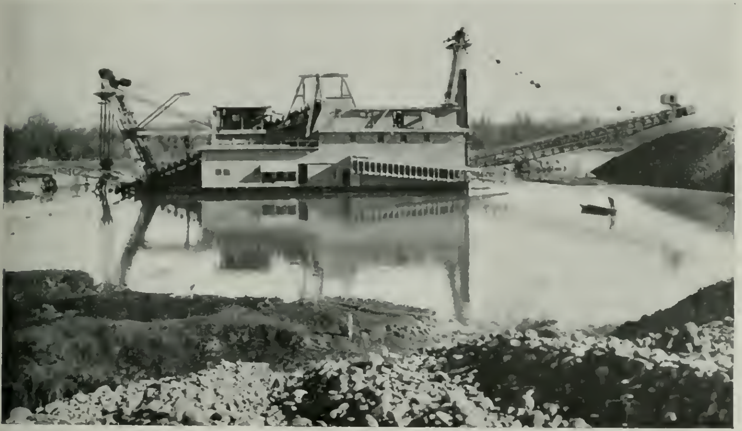
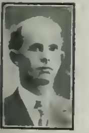


Yuba No. 13. The Largest Dredge in the World.

Gold Dredging in California

By C. E. YOUNG, Superintendent Marysville Power Division.



C. E. Young

California was born great, has acquired greatness and has had greatness thrust upon her. Not only did she produce more crude oil in 1911 than ever before and more than any State in the Union, of at least $35,000,000 in value, making her the greatest oil producer in the world, but her gold production last year exceeded all previous records since those pioneer years which gave California the name of the "Golden State", with the possible exception of 1883.

That $20,500,000 worth of gold came from our soils last year is very largely due to the perfection of the art of dredging, while the phenomenal production in 1852 of $81,000,000 was due to our proficiency in hydraulic mining. In both of these industries California is pioneer.

The hydraulic mining of our early days was pursued on the west flank of the Sierra

Nevada Mountains of Northern California, in gravel banks well up toward the backbone in the beds of ancient geological streams which apparently flowed parallel to the ridge. Along the living streams belonging to the present geological era which cut through the ancient ones at right angles, placer mining ran rampant following the discovery of gold in California in 1848 on the American River above Folsom.

A vast quantity of finer gold also was carried out into the Sacramento River Valley and deposited in the deltas of the living streams, long since covered with mountain sands and valley soils. It is these buried channels which are yielding their millions to the fifty-seven dredges now operating in California. The Feather, Yuba and American Rivers are excellent examples of comparatively recent geological deltas from which $7,850,000 worth of gold was taken last year, or about ten times the amount taken from these gravels in 1900, when the success of dredging methods had fairly been established.

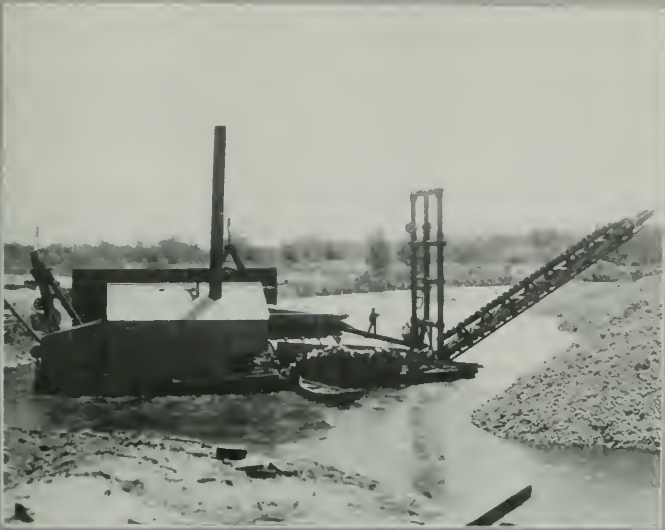
Thus gold dredging now represents 38 per cent of the total production of the State. In a manner this young industry is in the nature of a return to the pioneer times, for the same ditches which then carried water to the hydraulic mines are now carrying it to the dozen hydro-electric power houses of the Pacific Gas & Electric Company, whence issues the power which now operates the dredges. It can thus be seen that the "new awakening" of gold in California—in these shallow gravels as well as in the deep quartz mines along the mother lode—is due to electricity.

On March 1, 1898, the first successful gold dredge ever erected (see illustration) was put into operation by the Feather River Exploration Company near Oroville, California. This 63 horsepower father of the fleet cost some $30,000 and nearly as much every year to maintain it, as its chain of 32 buckets were of only 3½ cubic feet capacity. Pumps and other machinery were operated by steam, using wood as fuel. By its imperfections much gold was lost over to its riffles, but from its modest example has developed the giant barges of the present day which require from 700 to 1000 horsepower in electrical motors for their operation.

The dredges in use in 1911 cost some $250,000 a piece, weigh 4,640,000 pounds and carry 90 buckets, each of 15 cubic feet capacity which scrape the bedrock 60 or 70 feet below the surface where the best gold bearing gravel has settled. The buckets are of special high carbon and manganese steel, each weighing 3,700 pounds and handling from 300 to 500 cubic yards of gravel per hour. These are the largest gold dredges ever built and reflect well deserved credit on the Yuba Construction Co., of Marysville, California, which has grown up with the art since its inception in 1898. The shops of this company are substantial participants in "Pacific Service" with an installation of 617 horsepower.

The severe service which these dredges perform can be appreciated only by witnessing their operation and viewing the sea of rocks left in their wake. The expense of operation is some $40,000 per year, which, however, is only slightly greater than that of the dredge of 1898, owing to the introduction of electric motors in the place of steam. This expense sinks into insignificance, however, when one considers that in working out the richer gravels which often run 50c per cubic yard on the average, as high as $25,000 is sometimes taken out in a single week, while $10,000 may be considered a moderate production.

These new monarchs of industry are able to handle economically gravel running 10 cents per yard in gold and thus work out many acres which have hitherto been unprofitable. A fleet of 16 dredges is now enjoying the benefit of "Pacific Service"



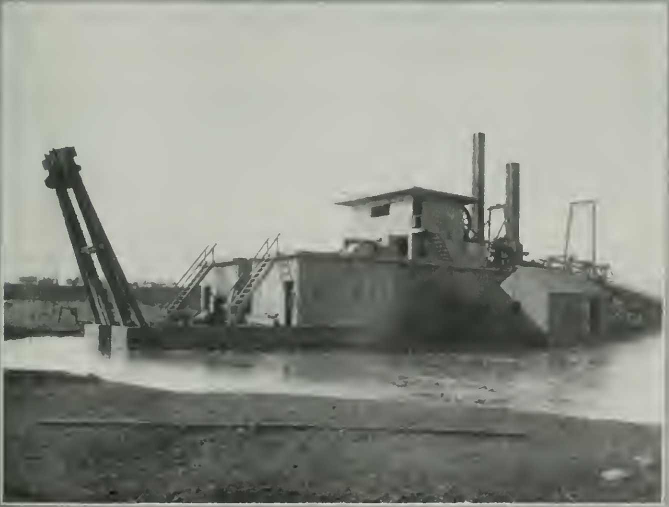


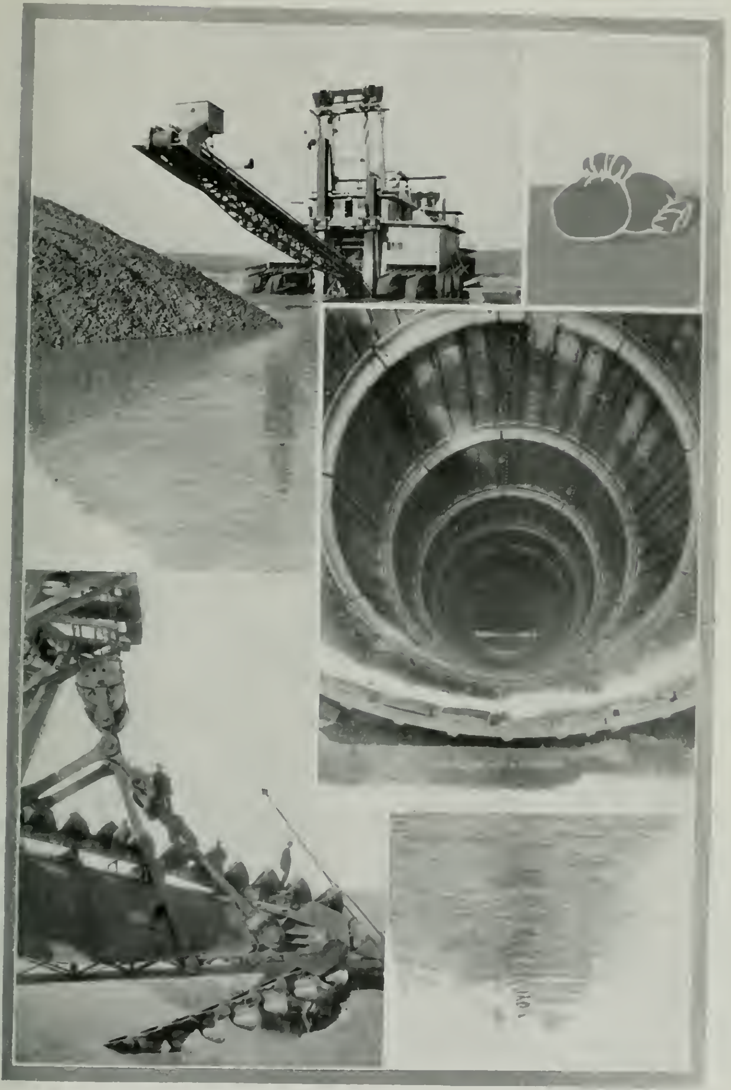
Fig. 1—"Couch No. 1," the first gold dredge ever built.
Fig. 2—"Continental," first successful electric dredge.

supplied from the Hammonton Substation, on the Yuba River, 12 miles from Marysville, where transformers step down from the 60,000 volt lines of our company to 4,000 volts, for general distribution.

The operation of a dredge is strikingly simple. The chain of buckets shown in the opposite illustration and the digging ladder carries the gold bearing gravel to the hollow revolving cylindrical screen, where it is washed with water. The fine gravel, sand and soil fall through the half-inch holes in the screen and are conveyed to a series of sluices containing riffle plates, 9,000 square feet in area, where the gold settles. Shown in operation in the same illustration, is the stern view of Yuba No. 13, discharging the muddy water into the dredge basin after passing over the riffles. The coarse gravel which does not fall through the revolving screen falls out from the end of the cylinder upon a 7-ply rubber belt conveyor 310 feet long and 42 inches wide, which carries it to the rock pile.

On the stern view of the dredge will be observed two vertical piles, one apparently shorter than the other. These are called "spuds" and weigh 90,000 pounds apiece, and terminate in cast-steel points weighing 21,000 pounds. One of these spuds at a time sticks into the soil and gravel, forming a pivot around which the dredge oscillates by means of steel cables attached to motor driven drums in the bow of the dredge and anchored to a tree or "dead man" suitable on the land nearby. It can be seen that by sticking down first one and then the other of these spuds while the dredge is swayed from side to side it can be given a cyclical forward movement several feet at a step.

Nerve Center of the big dredge.



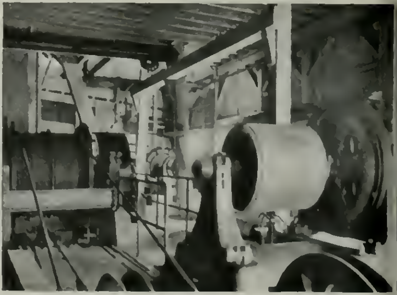
Stern view of dredge—Chain of buckets—Hollow revolving screen.

Rock-crushing plant, Oroville.

The frontispiece shows the waves on the sea of cobbles left as the dredge moves forward a step at a time. One is impressed by the ease with which the ponderous machinery is handled. The illustration shows the switchboard containing the switching gear for the various motors throughout the barge. Below this board is quite a roomful of resistance grids which are inserted in the secondary rotor circuits of the induction motors in starting and in obtaining any desired speed. In front of the switchboard, but not shown in the photo, are two small controllers and several levers connected with bell cranks and shafting for operating the clutches and brakes in various parts of the ship. The operator sitting in the midst of this apparatus in his lookout, controls completely the various machinery of the dredge.

From the 4,000 volt lines emanating from the Hammonton Substation, current is transmitted across the pond to the dredge by means of a 3-phase No. O submarine cable armored with steel wire to three 4,000 to 4,600 volt

Specimens of buckets.



A 3-phase induction motor.

Yuba Construction Company Shops.

Type H oil-filled, air-cooled transformers which are shown under a lean-to roof, in an inset on the lower deck near the center, showing the entire dredge.

A 300 horsepower, 440 volt Type M variable speed 3-phase induction motor operates the buckets and bucket gear. Therefore, besides a 35 horsepower variable speed Type M winch motor and 6 Type K motors of 150, 75, 65, 25 and 2 horsepower respectively, together with a 10 kilowatt lighting installation, the entire equipment totals 737 horsepower.

It is interesting to note the variety of new and most recent alloys of iron which are used in the construction of a vessel which in spite of all precautions must necessarily have a short life, due to the severe strain it undergoes. The bottoms of the buckets are made of high carbon, the cutting lip of the bucket being of the same material. The "sprockets" carrying the bucket chain are called "tumblers." The upper tumbler shaft is of nickel steel and 25 inches in diameter, while the cushion plates connected with it are of chrome nickel steel.

In the wake of these deliberate gold assimilating creatures is a sea of cobble stones remarkable in their unifority of size, in which has been found a by-product of great value in the macadamizing of California's soon-to-be-famous system of good roads, in its hundreds of miles of asphalted city streets and its manifold structures of reinforced concrete of constantly increasing popularity and diminishing cost.

Here again "Pacific Service" plays its part, as may be seen by the illustrations which are presented on these pages, of a most modern and complete rock-crushing plant at Oroville on the ancient delta of the Feather River which is now converting into gold again

Another view of Rock Crusher.

the stony purgings of the original gold dredge of 1898.

This plant has a capacity of 720 cubic yards per day. The electrical installation consists of 794 horsepower in induction motors controlled remotely at a switchboard, at which central point they are stopped and started at will at the 25 points of application throughout the plant.

There are installed one 200 horsepower, one 100 horsepower, three 75's, one 50, one 35 and eighteen other 3-phase motors of smaller horsepower, each interesting in that they work in a dense atmosphere of rock dust as fine as cement with most cheerful reliability; a forceful illustration of the severe service which electricity is called upon to supply.

As the dredges deposit the rocks considerable dirt settles to the bottom of the field, so that after the rock crushers have stripped off their share, there is sufficient soil to support the hardy eucalyptus.

The land is thus available for a secondary by-product of firewood.

In several instances the dredges have formed levees to confine the rivers glutted with sand by the hydraulic mines of a generation ago, thus protecting farming lands in time of flood.

It is thus seen that the dredging industry as fostered by electricity is a most substantial part of California's golden fame.

Electrical Conditions in Japan

Interesting information on the general condition of the electrical industry in Japan has been received from W. P. Chapman, formerly of New York, but for the past three years a traveler for the Holophane Company in the Flowery Kingdom.

While exact statistics are hard to obtain, the following regarding the conditions in the three largest cities of the kingdom may be taken as fairly accurate:

In Tokyo, a city with a population of about 2,200,000, there are 116,000 houses using electric lights, the total number of lamps in use being 504,000, showing an average of less than five lights per house.

The total number of houses is estimated at 400,000, 29 per cent of which are electrically lighted.

Osaka, with a population of 1,230,000, had 140,000 houses with electric lights, using a total number of 370,000 lamps, which represents an average of less and three per house.

There are 280,000 houses in the city, 50 per cent of which have electric lights.

Out of the 70,000 houses in Kyoto, a city with 440,000 inhabitants, 16,000, or 23 per cent, have electric lights, the total number of lamps being 60,000, an average of less than four lamps per house.

Mr. Chapman writes that the commercial methods of the electric light companies in Japan are rather crude and that there is a strong tendency to discourage any attempt to introduce new ideas in business-getting, the policy of the companies being a most conservative one.

—*Chained Lightning.*

After-Dinner Speaker at Jovian Banquet: "Electricity makes the best Toast."

J. Pierpont Morgan's Evidence of Faith in "Pacific Service"

Its Effect Upon the Situation in California

Town Talk, in its issue of December 30th, comments as follows upon the recent big transaction with the leading financial house of New York City by which the Pacific Gas and Electric Company is enabled to complete its organization and perfect its system:

A BIG TRANSACTION

The full significance of the news that one of J. Pierpont Morgan's syndicates has purchased $17,000,000 of bonds of the Pacific Gas and Electric Company no daily paper has taken the trouble to expound. Yet the full significance of it is far beyond the average citizen's power of apprehension. And probably it is also beyond the comprehension of the average daily. Else why have the dailies neglected to enthuse over so important a piece of news? It is perhaps the most important that has come over the wire since Congress decreed that the Panama-Pacific Exposition should be held in San Francisco. The importance of it is to be expressed only in terms of dollars and cents, which after all are the terms most pleasing to the ears of most of us. As a result of the purchase made by the Morgan syndicate ten millions of eastern dollars will be spent in San Francisco within the next sixty days. This is pretty good news for a starter. This money will be paid out for the redemption of underlying bonds, all of which are held by local banks and local captains of finance. The other seven millions will be spent in the course of the next year or so in extending and developing the system of the big local power and light company. Now so large a sum of money is not to be dumped in San Francisco in a short space of time without making a perceptible impression.

MORGAN'S FAITH IN OUR FUTURE

Not a little of the significance attached to the Morgan deal is to be found in the fact that never before in his career did J. Pierpont Morgan purchase bonds of the character of those which the Pacific Gas and Electric Company had to sell. He put through the deal after a protracted investigation conducted by financial experts and attorneys. It is therefore to be inferred that he regards the Pacific Gas and Electric Company, a distinctively Californian corporation, as one of the most solid of industrial institutions. Also it is to be inferred that he has confidence in the promise of prodigious development in the territory on which the company depends for its earnings. And now that he has taken the bonds of the Pacific Gas and Electric Company they will be listed on the New York Stock Exchange and the corporation will have the world for a market.

MERGER MEN SHOCKED

To some people who appreciated the significance of the Morgan purchase it was far from gratifying. I refer to the financiers who were trying to effect a merger of the power companies. From the gossip that one hears in financial circles the news of the Morgan purchase must have given the men behind the Western Power Company a forty-horsepower shock that rattled their nerves and caused general depression. The men behind this company, all of whom are Eastern capitalists, have been most eager for a merger. They felt that it would solve many embarrassing problems for them. From a gentleman versed in the mysteries of local finance I hear that they came to San Francisco some time ago to put through a deal possessing many charms from their viewpoint. Familiar with all the dips, spurs and angles of high finance, they came hither to initiate the uncultivated of San Francisco. The man holding the key to the local situation is Frank Drum, President of the Pacific Gas and Electric Company, who is said to be as keen as the shrewdest of the financiers that came out of the East. The proposition of the Western Power men had to be approved by Drum, and it didn't fascinate him at all. He was neither to be bluffed nor cajoled. While the Eastern financiers were twisting and turning Drum was going ahead with the affairs of his company and it was he that put through the deal with Morgan, the effect of which will be to make clear to all and sundry that the Pacific company occupies a most enviable strategic position.

ABSORPTION BUT NO MERGER

What the financiers of the Western Power Company will do now it is hard to say. Perhaps the company may be absorbed. Suffice it that there is no longer any likelihood of a merger, for which perhaps we should be thankful, since the Pacific Gas and Electric Company under Drum's management is conducted on the very highest business principles. Mergers are generally productive of water and other things that are justified by financiers on the principle of future development. Besides if there had been a merger the most powerful of all purely Californian corporations might have lost something of its character. As it is this company is exclusively in the hands of Californians who are content to make money by the old-fashioned legitimate processes that prevailed in the days antecedent to the birth of frenzied finance.

Now For a Baseball Campaign!

The North Beach Playgrounds at the corner of Bay and Powell Streets have been secured as a place to practice, and all players are requested to appear there at 2 o'clock Saturday, February 10th, 1912, weather permitting.

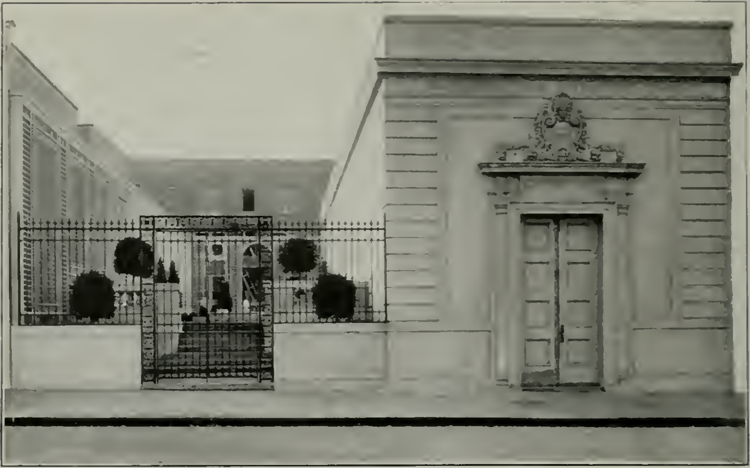
We want at least 18 or 20 players on hand in order that two teams may be selected and a game started. If possible, arrange your work so as to have the afternoon off. A number of snap-shots will be taken and reproduced in the February magazine.

Bring your own uniform, baseball shoes, glove and bat; same to be used until our record warrants any further expenditure for such material.

The original idea of playing Sunday baseball has been abandoned and Saturday afternoon games only are to be scheduled. The Manager will seek games with the Army Club at the Presidio and the Navy Team at Pensacola Training Station; also St. Ignatius, Sacred Heart and St. Mary's College. Later we may play the Olympic Club, University of California, and teams representing various banks and business houses in the city.

It is up to the players to respond and show some real interest. The last game was played some time in May, 1911, and it is now time to "Ginger Up and Get Started."

MARK MENSING.



New Station "D," San Francisco.

Station "D," San Francisco

By GEORGE C. HOLBERTON, Manager San Francisco District.

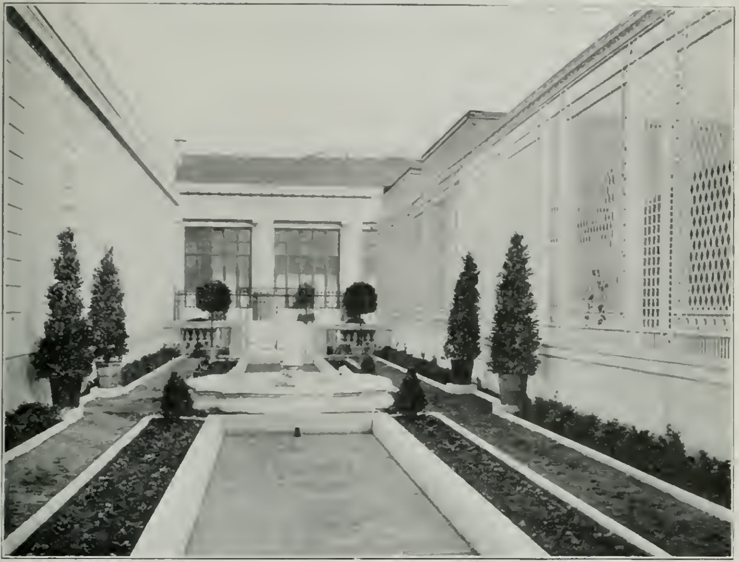
G C Holberton

We illustrate in this number Station "D", San Francisco, which the writer believes to present the handsomest appearance of any of the electric substations that we have yet constructed and yet does not represent any great expenditure of money over what is usually spent for stations of similar capacity and type of service, and shows how, with a little thought, the stations can be made attractive in appearance without in any way sacrificing their utility.

The principal object in reconstructing the station was to provide for the installation of a storage battery for which purpose we bought the property adjoining the original station.

When it was decided to build this substation the writer thought that we should endeavor to carry out at least a similarity in design in our sub-stations, and the sub-station at Ellis and Broderick Streets which has already been described in this magazine had brought forth such favorable comment that it was decided to endeavor to make this station of a similar appearance. By comparing the illustrations herewith with those of Station "G" which appeared in the magazine for May, 1911, you will see that this result was accomplished.

The next step which presented itself was the erection of a building sufficiently large to accommodate the battery without wasting head room and, at the same time, one that would not be a freak in appearance. To appreciate this you must bear in mind that the Bush Street elevation which is shown in the illustration is approximately twelve feet higher than Fern Avenue in the rear of the building, so that if a structure were built sufficiently high to make a presentable appearance on the Bush Street side it would be entirely too high for our purpose on the Fern Avenue end.



Roof Garden at Station "D."

The writer, therefore, conceived the idea of keeping the roof as low as possible and converting it into a garden such as shown in the illustration, which, due to the small head room required by the battery, was easily accomplished.

As the main sub-station building shown on the right contained transformers and required water for cooling them, it was deemed advisable to put in the fountain shown in the center of the garden in lieu of the usual unsightly tank upon the roof. It was necessary, of course, to light the battery room, to do which we placed sky-lights in the center of the roof; and as this, perhaps, might look a little unusual in a garden we simply made the skylights waterproof, and converted them into ponds by placing a little concrete coping around them, as shown in the illustration.

The pictures presented herewith show the effect of this garden as well as possible in an ordinary photograph, but to fully appreciate the appearance one should see this station so as to get the color effects, as the green bay trees and box hedges harmonize so well with the grey of the cement.

Underneath this garden we are now installing a storage battery of the new high capacity type. Although occupying but small space as compared with the older forms of lead battery, this battery has a capacity of 4,000 ampere hours, and can be discharged for ten minutes at the rate of twelve thousand amperes, which means that the entire load of this district can readily be carried even over the peak hours by this battery in the event of failure of the cables or apparatus, as before this battery can be run down we can readily get other cables or apparatus in service.

The Company has already installed such a battery at Station "I", situated near Eighth and Mission Streets, and is now preparing to install another in the down town district north of Market Street.

Chronology of the Early Development of Gas Lighting

By W. R. MORGAN, Superintendent Gas Distribution, San Francisco District.

W. R. Morgan

B. C.	
1450	First artificial lighting by "fire-pans" or "censers."
500	Oil lamps first used.
300	Earliest mention of coal by the Greek philosopher Theophrastus.
A. D.	
852	First mention of coal in England; contained in the Saxon Chronicle of the Abbey of Petersborough.
1000	Coal began to replace wood and charcoal.
1180	Coal first mined systematically in England.
1250	Coal became a commercial commodity.
1259	King Henry III granted charter to mine coal in Newcastle.
1272	Coal used in London.
1316	A royal proclamation issued forbidding the use of coal in London on account of the "noisome smell."
1500	About 1500 Brazil Valentine discovered muriatic, sulphuric and nitric acids.
1541	About this time Paracelus discovered hydrogen gas.
1560	Special licenses granted to make charcoal and smelt iron.
1580	Use of coal prohibited by Queen Elizabeth in London while Parliament was in session, because "the health of the knights of the shires might suffer during their abode in the Metropolis.
1609	Van Helmont settled in Brussels and gave the name of "Gas" (from "Geist," meaning ghost or spirit) to the aeriform bodies produced by combustion and by fermentation.
1645	British Royal Society formed (constitution adopted 1662).
1659	Thomas Shirley investigated a natural gas well in Lancashire, England, and wrote the first description of experiments with natural gas published in the Transactions of the Royal Society for June, 1667).
1662	The use of coal had become so extensive that in 1662 the sum of £200,000 was raised by means of a "Hearth Tax" imposed on fireplaces by King Charles II.
1662	Robert Boyle ennunciated the statement known as "Boyle's Law."
1660 to 1670	Dr. Clayton experimented with natural gas at Lancashire, England, and distilled coal to produce gas, which he stored and lighted. An account of his experiments was published in the Transactions of the Royal Society for 1739.
1675	Coal distilled for the production of tar.
1676	Boyle's Law confirmed by Mariotte.
1679	A "cole mine" near Ottawa., Ill., U. S. A., mentioned by Father Hennepin, a Jesuit missionary.
1697	First street lighting ordinance passed in New York City.
1700	Coal exported from England to European countries.
1726	Dr. Stephen Hales published "Vegetable Statics," describing his experiments on the distillation of coal.
1749	Coal mined in Richmond Basin, Virginia, U. S. A.
1754	Dr. Joseph Black discovered carbonic acid gas (carbon dioxide).
1755	Coal discovered in Ohio, U. S. A.

Chronology of the Early Development of Gas Lighting

1760 Theory of Specific Heat, and of Latent Heat, propounded by Dr. Steven Black.

1762 Oil street lamps first lighted in New York City.

1766 A gold medal offered by the French Academy of Science as a prize for the best essay on street lighting, won by Lavoisier.

1767 Hydrogen discovered in water by Henry Cavendish.

1774 Oxygen discovered by Joseph Priestly in England, and by Charles Scheele in Sweden.

1775 The composition of atmospheric air discovered by Lavoisier.

1776 The water lute (water seal) invented by Priestly.

1781 A patent granted to the Earl of Dundonald for distilling coal. All the products of distillation were mentioned except gas.

1781 The gas holder invented by Lavoisier.

1784 Jean Pierre Minckelers lighted gas distilled from coal as a demonstration to his class in the University of Louvain.

1790 Anthracite coal first mined in Pennsylvania.

1792 William Murdock distilled coal in an iron retort and conducted the gas seventy feet through tinned iron and copper tubes to light his house and grounds at Redruth in Cornwall.

1797 Murdock lighted with gas his house and office at Old Comnock.

1798 Murdock lighted with gas one of Boulton and Watt's shops at Soho, near Birmingham.

1799 Murdock invented the "D" slide valve (used in steam engines and gas meters).

1799 (Sept.) Philippe Lebon (in France) patented a "Thermolampe" for the production of gas by distillation from wood, coal, etc.

1801 Lebon lighted with gas his house and gardens in the Rue St. Dominique, Paris.

1802 (Apr.) Murdock gave a public display of gas lighting at Soho to celebrate the Peace of Amiens.

1803 Frederick Albert Winsor began experimenting with Lebon's gas apparatus at Hyde Park, London.

1804 Murdock built gas works and lighted Boulton and Watt's shops at Soho.

1804 (May) Winsor obtained first English patent for gas-making apparatus.

1804 Winsor gave a public display of gas lighting at the Lyceum Theatre, London.

1805 Murdock built gas works and lighted the cotton mill of Messrs. Phillips & Lee at Manchester; nine hundred burners were supplied.

1805 Samuel Clegg built gas works and lighted the cotton mill of Mr. Henry Lodge, near Halifax.

1806 Edward Heard patented a process of using lime as a purifier.

1806 David Melville, in Newport, Rhode Island, lighted his house with coal gas.

1806 (Dec.) Lead pipes were laid in Pall Mall, London, by Winsor. These were the first gas mains laid in a public street.

1807 (Jan. 28th) One side of Pall Mall lighted with gas.

1807 (June 4th) Both sides of Pall Mall lighted with gas.

1807 (July 12th) First meeting of gas stockholders (proposed National Light and Heat Company, London).

1808 (Feb. 25th) Murdock read a paper, describing the gas installation at Phillips & Lee's cotton mill, before the Royal Society, and was awarded the Count Rumford Gold Medal.

1809 (May 5th) Hearing before the House of Commons, upon Winsor's application for a charter for the "National Light & Heat Company." He was opposed by Murdock and Watt.

1809 Clegg wrote a paper on the application of gas lighting to mills and factories, and was awarded a silver medal by the Society of Arts.

1809 Wet lime purifier introduced by Clegg in a plant to light Mr. Harris' factory at Coventry.

1810 Application made to Parliament by Winsor and his stockholders to form the London and Westminster Gas Light & Coke Company.

1810 Act of Incorporation passed by Parliament in favor of the London & Westminster Gas Light & Coke Company.

1812 (Apr.) A Royal Charter granted to the London and Westminster Gas Light & Coke Company. This was the first gas company formed.

1812 The hydraulic main introduced by Clegg in a plant to light the cotton mills of Ashton Brothers at Hyde.

1813 Clegg became engineer of the London & Westminster Gas Light & Coke Company.

1813 (Mar. 18th) David Melville obtained a patent on his apparatus for making coal gas.

1813 (Dec. 31st) Westminster Bridge lighted with gas for the first time.

1814 (Apr.) The oil street lamps of St. Margaret's Parish, Westminster, were replaced with gas lamps.

1815 (Dec. 9th) First gas meter invented by Clegg.

1815 (Dec. 28th) Gas lighting first proposed for Philadelphia by Mr. James M'Murtie.

1815 First treatise on gas lighting published by Frederick Accum.

1816 The cylindrical gas holder first appeared, constructed at the works of the London & Westminster Gas Light & Coke Company, under direction of Samuel Clegg.

1816 First gas company incorporated in the United States, at Baltimore, Maryland.

1816 Clegg invented the wet meter with revolving drum.

1817 Clegg's wet meter remodeled and improved by John Malam.

1819 (June 19) Ed. Heard and David Gordon obtained a patent for compressing gas in metal drums to furnish a portable supply.

1820 Process of Oil Gas manufacture patented by Taylor and Martineau.

1821 Act of Parliament passed, authorizing the erection of oil gas works.

1821 (Apr.) Oil gas works built at Bristol, Colchester, Dublin, Edinburgh, Hull, Leith, Liverpool, Norwich, Plymouth, and Taunton.

1823 Malam patented a process of dry lime purifying.

1823 The Boston (Mass.) Gas Light Company established.

1824 (Jan. 19th) Broadmeadow patented the exhauster.

1825 The gas governor invented by Samuel Crossley.

1825 New York Gas Light Company established.

1825 Benzole discovered by Faraday.

1825 First gas lamps in Brooklyn, New York.

1828 First gas works in Boston, Mass., built on Hull Street.

1829 (Jan. 1st) First gas lamps in Boston lighted in Dock Square.

1830 Manhattan Gas Light Company established in New York.

1832 Meters first manufactured in the United States by Samuel Hill, in Baltimore, Maryland.

1833 (Mar. 19th) A dry meter invented by James Bogardus, an American engraver, was patented by Miles Berry.

1833 (Oct. 12th) The Telescopic Holder patented by Hutchinson, engineer of the London Metropolitan Gas Company. This holder was invented in 1824 and described in Creighton's Encyclopedia.

1835 Gas meters manufactured in New York by Young, and in 1836 by Samuel Down.

1840 Meters adopted by the London & Westminster Gas Light & Coke Company.

1843 Wm. Richards made a dry meter with two diaphragms, two slide valves and a dial, which, with minor improvements, is the meter in use today.

1846 Gas meters made legal in France.

1849 A company formed in Boston, Mass., by Mr. George Darracott, to manufacture meters.

DATES OF GAS LIGHTING IN PRINCIPAL CITIES OF THE WORLD

1807	London, England.
1816	Liverpool, England.
1816	Baltimore, Maryland.
1817	Manchester, England.
1818	Sheffield, England.
	Glasgow, Scotland.
	Edinburgh, Scotland.
1819	Birmingham, England.
	Bristol, England.
	Paris, France.
	Brussels, Germany.
1822	Munich, Germany.
	Belfast, Ireland.
1823	New York City, N. Y.
1825	Amsterdam, Netherlands.
	Hanover, Germany.
	Ghent, Belgium.
1825	Rotterdam, Netherlands.
1827	Berlin, Germany.
1829	Dresden, Germany.
1832	Louisville, Ky.
1833	Vienna, Austria.
1833	New Orleans, La.
1834	Havre, France.
1835	Caen, France.
	Amiens, France.
	Bologne, Italy.
	St. Petersburgh, Russia.
	Lyons, France.
1836	Philadelphia, Pa.
	Pittsburgh, Pennsylvania.
1838	Nantes, France.
	Leipsic, Germany.
1840	Cincinnati, Ohio.
	Montreal, Canada.
1841	Manchester, New Hampshire.
	Sydney, Australia.
1842	Toronto, Canada.
1843	Halifax, Canada.
1844	Hamburg, Germany.
1845	Madrid, Spain.
1846	Rouen, France.
	St. Louis, Missouri.
1847	Fall River, Mass.
	Breslau, Germany.
	Newark, New Jersey.
1848	New Haven, Conn.
	Patterson, N. J.
1848	Providence, R. I.
	Rochester, N. Y.
1848	Washington, D. C.
	Buffalo, N. Y.
1849	Quebec, Canada.
	Norfolk, Virginia.
	Cleveland, Ohio.
	Detroit, Michigan.
	Syracuse, N. Y.
	Utica, N. Y.
1850	Chicago, Illinois.
	Columbus, Ohio.
	Hartford, Conn.
	Worcester, Mass.
	Kingston, N. Y.
1851	Hamilton, Ohio.
1852	Indianapolis, Indiana.
1852	Memphis, Tenn.
	Buenos Ayres, Argentina.

1853	Brockville, Canada.
	Rome, Italy.
	Heidelberg, Germany.
	Milwaukee, Wisconsin.
1854	Belleville, Ill.
	Nice, France.
	St. Joseph, Missouri.
	San Francisco, Calif.
1854	Toledo, Ohio.
	Ottawa, Illinois.
1855	Vera Cruz, Mexico.
1856	Atlanta, Ga.
1856	Melbourne, Australia.
	Warsaw, Russia.
1857	Scranton, Pa.
	St. Paul, Minn.
	Copenhagen, Denmark.
1858	Tasmania Island.
1860	Portland, Ore.
1861	Malta Island.
1862	Shanghai, China.
	Hong Kong, China.
1863	Smyrna, Asiatic Turkey.
1864	Alexandria, Egypt.
1865	Bombay, India.
1865	Rio Janeiro, Brazil.
	Christchurch, New Zealand.
1867	Moscow, Russia.
	Kansas City, Mo.
	Los Angeles, Cal.
	Oakland, Cal.
1868	Ceylon (Island).
	Omaha, Nebraska.
1869	Stockton, Cal.
1870	Leeds, England.
1871	Yokohama, Japan.
	Minneapolis, Minn.
1872	Tokyo, Japan.
	Montevideo, Uruguay.
1873	Seattle, Washington.
1878	Cologne, Germany.
1879	St. Johns, Newfoundland.
1885	Tacoma, Washington.
1887	Spokane, Washington.

Electric Talks

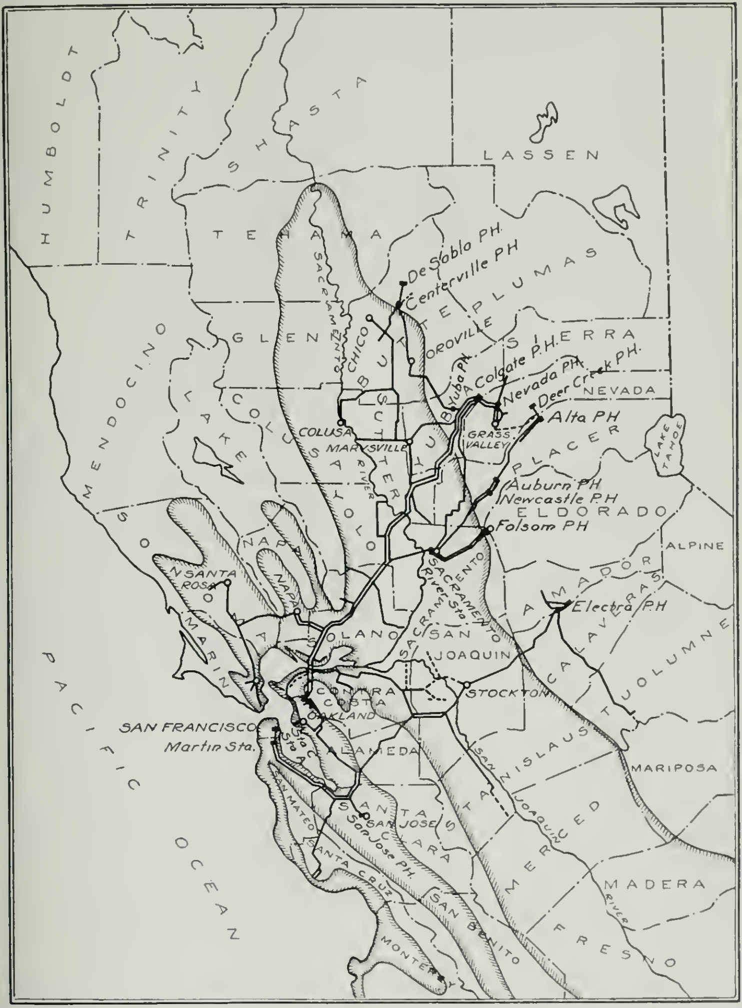
X.—"Pacific Service" Makes the Land Yield Wealth

By JOSEPH P. BALOUN, Chief Draftsman.

J. P. Baloun

Cheap electrical power is becoming a great factor in the development of irrigation and reclamation projects in Central California. The farmers are realizing the supreme advantages to be obtained from the use of electricity for power for irrigation, lighting, and the many household purposes to which it may be so readily applied.

The reduction of actual manual labor to the owners and tillers of the soil is beyond question. Today the enterprising, progressive farmer seeks the maximum result in crops for a minimum expenditure of labor and cost. Electricity for running irrigating pumps, is furnished at a low rate by the large electric companies to bona-fide customers on guaranteed contracts, and where irrigation ditches are prohibitive, bored wells can be installed readily on ranch or farm. These wells are usually of an artesian nature and motor-operated centrifugal or rotary pumps, or geared triplex or other multiple gang plunger pumps will lend assistance to modern farming such as the indefinite or unreliable wind-



Shaded territory shows 14,797,800 acres of land that can be irrigated or reclaimed with cheap electric power in Central California.

mill never was capable of doing. This absolute guarantee that plenty of water may be had at any time of the year on any of our millions of acres of farming land, where anything will grow with sufficient water, is the blessing that is now being so extensively advertised in the far East.

Our other lands that lie so situated as to require artificial reclamation are as greatly benefited by the cheap electrical power for driving the centrifugal reclamation pump. As this can be run at any time of the year and for twenty-four hours per day, and every day in the year, if necessary, the vast territory comprising that extensive acreage of California known as the "Swamp Land Districts" becomes valuable and productive, for these tracts are level and the soil is deep and very rich. By the use of the motor-operated reclamation pump, a section of our glorious State that in some places would be flooded with water yearly, would be always under water in others, and in a state of unproductiveness and unsafeness here and there, is made to show commercially flourishing towns with established schools, libraries, churches, factories, packing houses, and other extensive essential conveniences to a modern town's make-up.

Electrically-operated dredgers watch the levees, protecting many thriving farming districts and towns. A lack of vigilance or a failure of electric power at a time when these giant electric motor-dredgers are most needed would mean a terrible loss of property and life. But the levee has long ceased to be a menace to the homestead seeker. Confidence in its construction, and safety is the result of the efforts of the large power companies to furnish sufficient electrical current for its protection through the operation of dredgers.

For the home-seeker to find the fulfillment of his dream, is now no longer a problem. Many subdivided tracts of farming land in Central California realize his ideal. There are to be found prize-winning berries and fruits which cannot be surpassed in any other part of the world. The land is cut into small tracts, the environs are thickly settled, and with the help of cheap power, the farmers are becoming independent, sending their children to college in the near-by towns and transacting their business, not in the old-fashioned surrey with a buggy top, but in a highly-finished electric automobile, preferred to the gasoline machine because its general maintenance is far cheaper and easier.

Suburbs are being connected with cities, and with low commutation rates, often fifteen cents per hour will cover the charges. The general use of Electric vehicles for hauling is made possible by first, the lower cost of these machines each year; second, the cheap electric power delivered at farm house, orchard, barn, shop or garage. At the present time a remarkable number of electric truck licenses are being issued for cars to carry products from the producer to the consumer direct.

The question of irrigation is a simple one where there are no great diversion dams, immense reservoirs or viaducts or head gates to install and maintain. Irrigation ditches are economical to the highest degree. A flat charge is made for the water-right, and in some sections a low rate per acre is made for maintenance. When the water-right is sold with the land, a very low sum is assessed for operating expenses. It can be estimated readily that for a power company to furnish irrigating ditches and cheap electrical power means an enormous yield to the land where barley and wheat can be made to give sixty bushels to the acre, oats nearly as much, and all of excellent quality. Some of the "Pacific Service" customers are obtaining as high as two hundred bushels of potatoes to the acre.

"Pacific Service" makes no pretense to being an "automatic" servant of mankind on the Pacific slope, but it does claim to go a very long way toward developing the agricultural advantages of California.

Transformers

By J. P. JOLLYMAN, Engineer of Electric Construction.

WHEN using transformers on a circuit of a different voltage from that for which they were designed, it sometimes becomes necessary to connect part, or all, of the low tension winding in series with, or opposition to, the high tension winding to obtain the desired voltage. Such connections may increase or reduce the capacity of the transformer. The following is a method which may be used to determine the capacity under these conditions.

When comparing capacities under different connections, it is assumed that no part of the winding shall carry more current than it would under normal full load conditions, nor will more than normal voltage be applied to any part of the winding.

For example, consider the case of a 100 kilowatt, 2,000 to 200 volt transformer. Figure No. 1.

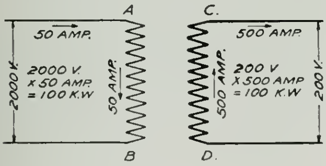


Fig. 1

Here the high tension winding has a capacity of 50 amperes and the low tension 500 amperes. Suppose a voltage be applied to the winding A. B., which for an instant causes current to flow from A to B. This current will be only a small per cent of full load current. This so magnetizes the iron core that a voltage is induced in the winding C. D. whose direction is from D. to C. If a load be connected from C to D, current will flow in the winding from D to C, and a corresponding current will flow from A to B. Thus the direction of the flow of current in the high tension winding at any instant of time is opposite to the direction of the flow of current in the low tension. The product of the volts of the high tension circuit times the amperes which flow in the high tension circuit will be practically the same as the product of the volts of the low tension circuit times the current in the low tension circuit.

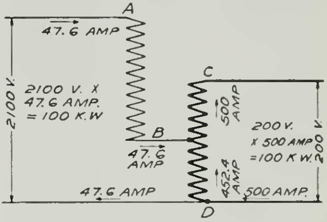


Fig. 2

The magnetizing current will be supported by whichever circuit is the source of power, and is so small that it may be neglected when making calculations of capacity.

First:—When a part of the low tension is used to boost the high tension voltage, Fig. No. 2.

An examination of Fig. No. 2, shows that the winding from B to D carries the difference between the low tension and high tension currents; winding A. B. carries less than in Fig. No. 1 and winding C. B. carries the same as in Fig. No. 1. Hence, the capacity of the transformer is not increased. The same reasoning will apply when the terminal B is connected to any point in the low tension winding except to C.

Second:—When all the low tension is used to boost the high tension voltage. Fig. No. 3.

In this case winding C. D. carries only the difference between the low tension current and the high tension current. This may be 500 amperes, provided the corresponding current in the winding A. B. is not over 50 amperes. At any load the ratio of the low tension current to the high tension current will be as the high tension voltage is to the low tension voltage. In this case the ratio is 11 to 1. Hence the difference will be to the low tension current as 10 is to 11. Therefore when the current in D. B. is 500 amperes the low tension current will be 550 amperes and the high tension current in the winding A. B. will be 50 amperes.

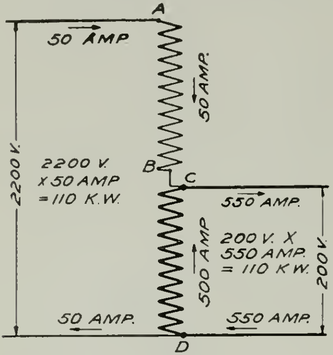


Fig 3

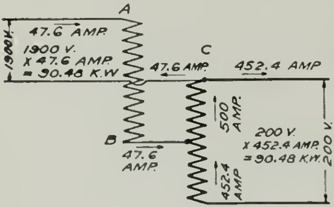


Fig. 4.

Under these conditions the capacity of the transformer is increased by the same per cent that the high tension voltage is increased. In this case the transformer becomes a compensator, or auto transformer. If the voltage from A to B equals that from C to D the compensator connection will give a 2 to 1 ratio and twice the output of a 1 to 1 ratio which would be the case if connected as in Fig. No. 1. This shows the economy which may be obtained by the compensator connection.

Third:—When part of the low tension is used to lower the high tension voltage. Fig. No. 4.

In this case the low tension winding from B to C carries the sum of the high tension current and low tension currents. The high tension current is to the low tension current as 200 is to 1,900 or as 2 is to 19. The low tension current is to the sum of the two currents as 19 is to 21. Hence, if 500 amperes flow from B to C, the low tension current will be 19/21 of 500 or 452.4 amperes, and the high tension current will be 2/21 of 500 or 47.6 amperes.

This connection decreases the capacity of the transformer. The capacity will have to be determined in each case. The same method will apply when the terminal B is connected to any point in winding C. D. It may be shown that when B is connected to D the per cent reduction in capacity is the same as the per cent reduction in high tension voltage.

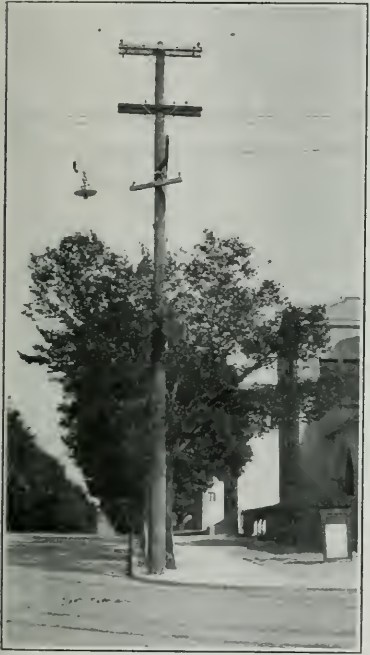
Common Sense

Common sense is a curious thing, inasmuch as every one, secretly at least, firmly believes that he possesses it in its true form and suspects that about everybody else lacks it, at some time or other at least. What one man may consider to be good hard common sense is often judged by others to be the limit of foolishness.

Perhaps one way in which proof of a man's exercise of common sense may be given is by "delivering the goods"—that is, all the goods he can.

Meeting a Street Lighting Problem

By FRANCIS E. WILKINSON, Distribution Department.



Lighting a shady street corner.

OF ALL the problems engineers are called upon to solve, that of public street lighting is perhaps the most difficult. This is due not so much to engineering difficulties as to the necessity for studying out the best method of serving the public and maintaining its good will.

It is not the intention of the writer to attempt to enumerate all the difficulties attending this work, but it may interest the readers of this magazine to know how one difficulty was overcome. It is the practice to take care of the lighting of suburban and residential districts by means of a series of tungsten lamps suspended from a goose-neck bracket. The distance which the lamp can be set out from the pole by the use of a bracket is necessarily limited owing to the difficulty in replacing lamps. On account of this, the proper illumination of the street often suffers, particularly where trees are present. To overcome this difficulty the writer designed a "crane" which enabled the lamp to be placed at a greater distance from the pole without interfering in any way with its maintenance, a means being provided for drawing the lamp in when desired.

A sample crane, ten feet in length, was made up in Oakland for trial purposes, and was tested with satisfactory results. There are now nearly 300 in use, with prospects for more, both for arc lamps as well as tungstens. This justifies the assumption that the invention has met with the desired success. The cost of the "crane" complete is nominal, and for any of our readers who have similar problems to solve, the details as to design, etc., can be obtained from the Distribution Department.

The photo shows the "crane" as installed, and gives a general idea as to its neatness in appearance and construction.

Stumped

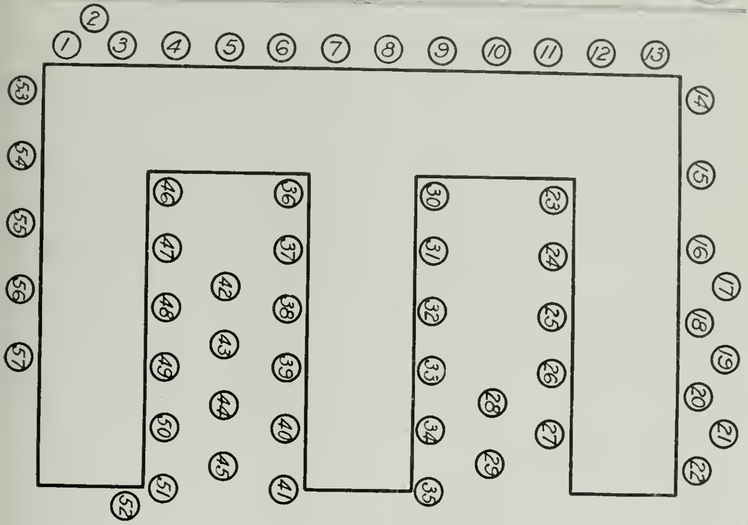
"It's no use," sighs the nature wizard. "I may as well give up."

"What is bothering you?" we ask sympathetically.

"I got started a few years ago on a whim of mine. I took a head of cabbage and crossed it with a white potato and grew eyes on it; then I crossed that with a cornstalk and grew ears on it; then I crossed that with a squash and grew a neck on it; then I crossed that with a cocoanut and grew hair on it—but hanged if I can figure out what to do for a nose and mouth!"—*Life.*

On the evening of December 19th last the regular meeting of the Association of District Managers of the Pacific Gas and Electric Company was followed by a pleasant reunion at Tait's Cafe, at which Vice-President and General Manager John A. Britton presided. The menu was of the choicest, the speeches were few but sparkling, and all present had a good time.

The illustration shows the assemblage seated at the banqueting boards, and there is a key by which all readers of the Pacific Gas and Electric Magazine may pick out the various heads of departments and district managers.



① John Werry
② R. Elsman
③ George Scarfe
④ H. M. Cooper
⑤ Charles L. Barret
⑥ James H Wise
⑦ John A Britton
⑧ Geo. C. Holberton
⑨ W. H. Foster
⑩ P. M. Downing
⑪ W. M. Henderson
⑫ W. H Kline
⑬ R. J. Cantrell
⑭ C. W. Mc Killip
⑮ S. V Walton
⑯ J. D. Kuster
⑰ W. A. Widenmann
⑱ F. J. Southerland
⑲ Don C. Ray
⑳ H C Vensano
㉑ J. H. Mc Dougal
㉒ C. E. Sedgwick.
㉓ H P. Pitts
㉔ J. P. Coghlan
㉕ W. E. Osborn
㉖ O. E. Clark
㉗ C. D. Clark
㉘ L. H. Hartsock
㉙ J. W. Hall
㉚ F. A. Leach Jr.
㉛ A. J. Stephens.
㉜ William Hughes
㉝ W. E. Eskew
㉞ C. E. Young
㉟ F. H Varney
㊱ J. O. Hansen
㊲ George H Bragg
㊳ J. C. Love.
㊴ George C Robb
㊵ John H Hunt
㊶ S. J Lisberger
㊷ A. H. Burnett
㊸ C. C. Copeland
㊹ I B. Adams
㊺ James Martin
㊻ J. O. Tobey
㊼ H B Heryford
㊽ H. A Laidlaw
㊾ F. R George
㊿ J. W. Coons
(51) J. P. Jollyman
(52) Joseph Mini
(53) E W. Florence
(54) W S Grover.
(55) E. B. Henley
(56) H Bostwick
(57) L H Newbert.

Pacific Gas and Electric Magazine

PUBLISHED IN THE INTEREST OF ALL THE EMPLOYEES OF THE PACIFIC GAS AND ELECTRIC COMPANY

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FREDERICK S. MYRTLE - - - - - - EDITOR
A. F. HOCKENBEAMER - - BUSINESS MANAGER

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The Pacific Gas and Electric Company desires to serve its patrons in the best possible manner. Any consumer not satisfied with his service will confer a favor upon the management by taking the matter up with the district office.

VOL. III JANUARY, 1912 No. 8

EDITORIAL

ANOTHER MILESTONE has been passed, and we are all trudging along the highway of life, our hearts charged with renewed hopes and aspirations, the goal of Success ever before our eyes to impart fresh vigor to our efforts.

The New Year is full of promise. All over our Golden State there are signs of confidence in the future. Enterprise and expansion walk hand in hand. Three years from now there will be held in San Francisco a great international exposition in honor of the completion of the world's greatest engineering achievement, the Panama Canal. California must and will be ready for that event, prepared to receive and care for the great influx of visitors from all parts of the universe come to view, not only the Exposition but, also, the wonderland around it.

A goodly percentage of those visitors will come to stay. They will scatter over our State and take up their homes and ply their several vocations here, there, everywhere. Not alone San Francisco will benefit from the opening of the gates that join ocean to ocean. The great interior lies waiting to smile invitingly upon the prospective settler. California is not over-crowded, as yet. There is room and to spare among her rich mountains and fertile valleys.

So California, like a good housewife, must put things in order for the coming flood of welcome guests. There is no time to lose. The three years that lie between the present and the day when the gates of the great exposition will be flung open to the world, will fly like magic, and woe betide us if the stranger comes to find us unprepared to receive him!

After all, there is no cause for words of warning at this time. California is alive to the situation, and her children already are putting forth the best that is in them. The field of investment is enlarging daily, and the great work of developing the natural resources of our wondrous State is progressing with giant strides.

In this great work, the Pacific Gas and Electric Company is playing a most important part. Its system stretches out over almost the entire central and northern sections of California, and a glance at the plan of it affords the inquiring mind but a part realization of what it all means. It is a beneficial undertaking, for in its scheme of development it aims to enrich the vast territory it embraces, while seeking for itself nothing more than a fair and equitable return for honest investment. Surely such a work as this deserves encouragement at the hands of the citizens of California.

In the last issue of the Pacific Gas and Electric Magazine, announcement was made of a new bond issue, of which about $6,000,000 will be available in the near future for the extension of the Company's properties, including the development of additional hydro-electric plants to meet requirements for industrial, irrigation and reclamation projects that await but the necessary power to be carried into effect.

Here is an enterprise that is worth while. "Pacific Service" is its slogan, and it is eloquent enough. Consumers of gas and electricity will realize that "Pacific Service" means for them domestic comfort and the development of their private enterprises, industrial and agricultural. It is a mutual agreement between provider and consumer, and the great State of California is a party interested. There can be but one result. F. S. M.

Authorized Additions and Improvements

ALAMEDA COUNTY DISTRICT

Work has been commenced on extension of a three-phase line along the Castro Valley Road to take care of additional power consumers.

CONTRA COSTA DISTRICT

An auto-wagon has been purchased for use in the Electric Distribution Department.

MARYSVILLE DISTRICT

Work has been commenced on the installation of a distribution system in the town of Nicolaus.

An auto-wagon has been purchased for use in the Electric Distribution Department.

PETALUMA DISTRICT

Considerable work is being done by the Gas Department in the extension of mains in this district to take care of additional consumers.

REDWOOD DISTRICT

Work has been commenced on the extension of 7,000 feet of gas mains in Burlingame to take care of additional consumers.

A three-phase line has been extended along the San Francisco Road near Sunnyvale to take on additional power consumers.

SACRAMENTO DISTRICT

The purchase of automobile for use of Superintendent of Gas Distribution has been authorized.

Work has been commenced on the 2400-volt, three-phase service to supply Orangevale District.

SAN FRANCISCO DISTRICT

A new Locomobile has been purchased for use in this District.

SAN JOSE DISTRICT

A two-ton electric truck has been purchased for use in this District.

The installation of ninety additional electroliers for Market Street has been ordered by the city.

WOODLAND DISTRICT

A new booster, operated by an electric motor, has been installed at the gas works to take care of the additional load.

It's Cold in the Mountains

The mountain districts of Northern California are experiencing the coldest weather in many years. At Colfax, a serious interruption of transcontinental travel was threatened. Water for the locomotives is supplied at this point by the Pacific Gas and Electric Company, being brought in open conduits from the higher mountains. Ice forming in these conduits impeded the flow of water to such an extent that great difficulty was experienced in maintaining a flow sufficient to supply the engines.

Officials of the hydro-electric company say that this is an unprecedented occurrence at this season of the year. No interruption was caused to the electric service, fortunately, as the mammoth steam power houses around the bay are held in reserve for such emergencies, were able to take up the load.

Manager George C. Holberton, of the San Francisco District, announces the appointment of Mr. W. S. Coleman to take charge of the Contract Department for the metropolis, vice Mr. F. E. Cronise, resigned.

What the Press Has to Say

New Building at State Capital

Plans are Being Prepared for Structure that Will Cost Between $75,000 and $100,000

Architect E. C. Hemmings of this city has been appointed to draw plans for the proposed new building of the Sacramento Electric Gas & Railway Company to be erected on the corner of Eleventh and K Streets. The building was awarded to Hemmings by John Britton, head of the local company, after his recent visit in this city, during which he conferred with several architects. Hemmings will go to San Francisco in a few days to confer with Mr. Britton relative to the plans.

The company will spend between $75,000 and $100,000 upon the new structure. The details of the building have not yet been agreed upon, but it will probably be of concrete construction and four stories in height. It will be used by the company as an uptown office building. The present location at Second and J Streets is too far from the business center of the city to be convenient either for the company or its patrons.

The site owned by the company is 80 x 160. It is more than likely that only part of it will be built upon at present. The new structure will occupy an 80 x 80 holding on the corner. The 80 x 80 in the rear will probably be left as it is for the present.

The site upon which the structure is to be built was formerly owned by Simeon Brown and was occupied by him as a carriage shop. It was purchased by Brown several years ago for a song and was valued at $80,000 when he sold it.

As soon as Architect Hemmings completes plans for the new building, which will be in two or three months, the contract for the new structure will be let and work will be started. The building will probably be completed and occupied within the coming year.

—*Sacramento (Cal.) News*, Dec. 3, 1911.

Flat-Rate Wrong in Principle

Breeds Prodigality and Wastefulness—Public Utilities Commission in Eastern States Opposed to it

The "flat-rate" method of charging for electric current is wrong in principle, and it is gratifying to note that the Pacific Gas and Electric Company is realizing this fact. For signs and other display lighting, the method doubtless is useful, and equitable rates can be computed on the basis of regular consumption, but in the case of residences and stores, where the consumption varies with the exigencies of business or social activities, it is wrong. The flat rate breeds prodigality and wastefulness. Incidentally, it renders quite callous the consciences of many who otherwise are highly conscientious. It perverts human nature.

Public utilties commissions in several eastern states will not permit lighting companies to charge flat rates except in cases where there is a definite amount of current to be consumed every 24 hours. It is declared that unless a lighting company has a means of knowing what the maximum demand and average demand is going to be, it cannot furnish adequate service.

The people of Nevada City, for instance, are no different than the people of any other city. So long as the amount of current they use makes no difference with their bills, they are not going to bother about turning off lights that are not needed, except where they are actually objectionable at certain times, such as in a bedroom at night. This means that the lighting company must maintain a high maximum load on its system at all times.

If the lights were on meters, the company, with the knowledge that during the daytime and early morning hours there would be only a moderate consumption of current, would not have to carry as high a load during those times, and this would reduce its expenses. And if the company's expenses are reduced, a better basis would be provided upon which to fix rates.

With the State Railroad Commission now invested with the power to completely regulate service and rates of lighting companies, both the consumer and the lighting company are placed upon better terms. The commission will place much emphasis upon such matters as "peak loads," if it follows the precedents laid down by the Wisconsin commission. The new California law is based largely upon the Wisconsin commission law, the workings of which have proved most satisfactory to both the lighting and power companies and the people.

Altogether, Nevada City should welcome the advent of meters. By the use of tungsten lamps, which use only a small fraction of the current consumed by carbon lamps, better light will result; and if the people will learn —as other have done before—to turn out the lights they do not need, electric lights will be considerably cheaper.

—*Nevada City Daily Transcript*, Jan. 10, 1912.

Marysville Now Has Arches

General Rejoicing Over Lighting Improvements to Thriving City

Marysville has shown what she can do, almost at a moment's notice. Without adequate advertising, without even twenty-four hours for preparation, in the midst of a season in which every one is occupied with other thoughts and ideas, Marysville has held a celebration that rivals anything the valley has seen for some time.

While, of course, the arches were more or less criticised adversely while they were being put up, a privilege which the American people never deny themselves when it is a question of some public matter, yet so far as appearance count for anything, last night the whole town was unanimously in favor of the improvement, and the voice of objection was stilled. Of course, under certain conditions other forms of lighting might have been better, but it was a condition and not a theory that confronted the Chamber of Commerce and the people of Marysville, and they took the safest and what has now proven the wisest course.

Electroliers are to be erected further up the street. The savings bank is already busy putting one up now, and if we had more large buildings like the bank on the street, undoubtedly the electroliers would have been a wise idea all down the main thoroughfare of the town. But until we get a much higher sky line than we have today, electroliers are hardly appropriate. At any rate we have the arches and they are pronounced deservedly a success.

To Messrs. Poindestre, Kelly and Ewell is due the arduous work of collection, and to Mr. Poindestre the credit of the original conception of the scheme. We said at the time that the subscription was started that the city is to be congratulated upon having such enterprising citizens and we repeat the statement with emphasis now.

—*Marysville (Cal.) Appeal*, Dec. 21, 1911.

Will Improve Local Service

Manager Herman Weber of Petaluma Given Authority to Go Ahead

Manager Herman Weber of the Petaluma Gas and Electric Company was all smiles on Friday and was decidedly good natured, for he has been given authority to make an improvement to the local service which he has long fought for and for which many of the residents of the city have clamored. Following, as it does, the recent extensive extension of the electric light service, it is a big thing for Mr. Weber and shows that his efforts have not been unavailing.

On Friday Mr. Weber received official authority from the General Manager of the company to extend the local gas mains down Third Street and the San Rafael road as far as "The Palms," the beautiful home of the Cantels. Also through Mountain View Avenue and Sunny Slope Avenue. There are scores of homes in the new territory which will take advantage of the use of illuminating, fuel and cooking gas, and it will mean scores of new patrons. There are also many poultry raisers in the new district who can use the gas for hatching and brooding purposes. The improvement is a big one and will be hailed with delight. Mr. Weber states that he will order the material and begin work at once.

—*Petaluma (Cal.) Argus*, Jan. 12, 1912.

Gas Company Rapidly Spreading

The Pacific Gas and Electric Company is rapidly spreading their network of pipes over the west side district, and within a few months the entire section will be completed. The six-inch mains along Washington Avenue, between Standard and Richmond, have been placed, and the crew under the direction of Manager William Luce is now placing the four-inch lines along Park Place. The merchants along both these thoroughfares, as well as those along Richmond Avenue, will hail the coming of the fluid with pleasure, and many have placed orders to have gas connected with their business.

—*Richmond (Cal.) Independent*, Jan. 13, 1912.

Improvements at Auburn

The Pacific Gas and Electric Company have just about completed a very important piece of work in Auburn. The water main of this city that formerly consisted of a thirteen-inch pipe, has been replaced with one of sixteen inches. The total length of the new pipe line is some three thousand feet, and is made out of No. 12 Allenwood iron. It starts from the reservoir close to Professor Price's school, runs from there to the subway under the Southern Pacific track, and has made a wonderful increase in the pressure throughout the entire city. Auburn has an excellent Fire Department, but on account of the immense pressure furnished by the Pacific Gas and Electric system, no steam fire engines are needed. In the upper part of town the pressure is at least eighty-five pounds, while in the lower part it will run over 150 pounds.

While the work of excavating for pipes was going on, it happened on two or three occasions that the men unearthed small veins of gold-bearing rock. In some instances the specimens secured were literally peppered with gold, some of them assaying as high as $5,000 to the ton.

—*Sacramento Valley Monthly*, January, 1912.

Company Puts in New Line

The Pacific Gas and Electric Company is at present putting in a new line from their sub-station at Mission San Jose to Niles. The company has also installed a current regulator at their sub-station which will insure a steady light at all times. A better and steadier light and no shut downs are promised as a result of these improvements, which have cost the company many thousands of dollars.

The placing of this line to Niles is a recognition of the growing importance of the town and the faith of the electric company in the town's future. It also demonstrates the desire of the company to meet the wishes of its patrons by giving them a better service.

—*Niles (Cal.) Press*, Dec. 29, 1911.

Remarkable Display in Window

The Santa Rosa office of the Pacific Gas and Electric Company has a remarkable display in its show window of modern gas and electric appliances. The display is the volunteer work and planning of Leroy E. Daniels, a youth employed by the company in the local office.

Daniels first went to work and erected a wooden frame, and covering it with cloth, painted and laid it off for brick-work to represent a fire-place, and connected it up with the gas main. A fine evergreen tree was secured and brought to the office, where it has been tastefully decorated with electric lights and usual tinsel ornaments. The floor of the window seat was then covered with the moss from oak trees and a table placed in the room.

A portable electric table lamp was next attached to the wires and placed on the table. There is also a display of the various lines of electrical appliances carried by the company for sale, including a vacuum cleaner, two kinds of electric stoves, two kinds of irons and two kinds of toasters, a chafing dish, a coffee perculator and utility outfit. The whole makes a display which is attracting any amount of attention from all who pass the windows. It is all lighted up at night and presents a very inviting appearance.

—*Santa Rosa (Cal.) Press-Demacrat*, Dec. 14, 1911.

Globes Won't Burn for Ever

Santa Rosa Manager for Pacific Gas and Electric Gives Advice While Making New Installations

Manager Maitland G. Hall of the Santa Rosa Branch of the Pacific Gas and Electric Company, has a force of men out making an inspection of the electric system and testing the current in residences to see that everything is working as it should be.

It has been found that many complaints relative to weak current are due to no fault of the company, but entirely neglect on the part of the patrons of the company. "No good housewife," said Mr. Hall yesterday, "would thing of doing up her morning work if she used coal oil lamps without refilling the lamp and cleaning it and the chimney thoroughly. But the same good housewife will put an electric globe into service and never think of it again until it breaks.

"Electric globes are not supposed to burn over 500 hours. They do burn in most homes for 1,000 hours or more. They fail to give satisfactory light and the company is blamed. They use more current and less results are obtained. Now it is to overcome this that we are making a partial installation of new lights free of charge to educate the light-users to the necessity of having globes changed regularly. It will take less current and give better light for less money."

—*Santa Rosa (Cal.) Press-Democrat*, Dec. 3, 1911.

Ornamental New Poles

Linemen Busy on the Street-Lighting System for Martinez

On Tuesday morning the linemen of the Pacific Gas and Electric Company now working in Martinez on the new street-lighting system, began the work of erecting the brackets and ornamental arms on the poles from which will be suspended the tungsten lights which are to be placed in service on the local streets. As far as possible, new and larger poles are replacing the old poles of the company in the local streets, but it has been found necessary to erect many new poles from which the wires which are needed for the new system will be hung.

The new transformers to care for the tungsten lighting system have arrived, and are even now installed in the substation, waiting for the time when the cutting-over onto the new lines and service will take place for their to be placed in service. A few of the lights have been in service in Benicia for several nights, and the people there are more than pleased with the new system and the far better service thereby afforded.

Martinez (Cal) Gazette, Jan. 16, 1912.

Domestic Science Lessons

LESSON VI.—INVALID COOKERY.

By MRS. H. ROSE STEWART.

Always prepare food for the sick in the neatest and most careful manner. In sickness the senses are unusually acute, and far more susceptible to carelessness, negligence, and mistakes in the preparation and serving of food than when in health.

WHITE CELERY SOUP.

Take one-half pint strong beef tea, add equal quantity of boiled milk slightly and evenly thickened with flour. Flavor with celery, salt to taste.

ARROWROOT.

Mix one teaspoon Arrowroot with four teaspoons cold water. Stir into it one pint boiling milk, let simmer for five minutes. Stir all the time, one-half teaspoon sugar, a little salt, a little cinnamon or brandy. Corn Starch or Rice Flour Gruel is made the same way.

SAGO MILK.

One tablespoon sago, soak overnight in four tablespoons cold water, set in double kettle with a quart of milk, boil till sago is nearly dissolved, sweeten to taste.

WINE WHEY.

Heat one-half pint milk to boiling point, and pour into it a wine glass of sherry. Stir once round the edge and as soon as curd separates, remove from fire and strain.

MULLED WINE.

Into one-half cup boiling water put two teaspoons broken cinnamon, one-half dozen whole cloves, let steep ten minutes, then strain. Beat together two eggs, two tablespoons sugar. Stir them into the spiced water, pour into this a cupful of wine boiling hot. Pouring from one pitcher to another will make it foamy.

N. B. Wine should never be boiled in tin.

MILK PUNCH.

To one-half pint milk (cold) add two teaspoons sugar, one teaspoon of brandy or sherry. Stir till sugar is dissolved.

EGG NOGG.

Beat white of egg, stir into it a cup of milk, a little sherry or brandy and nutmeg.

CHICKEN BROTH.

Old fowl is best as it makes it a more nutritious broth: Skin, break bones with mallet, cover with cold water, simmer three hours. Season. Rice or tapioca, if desired, can be boiled with it.

OATMEAL GRUEL.

Boil tablespoon oatmeal in pint of water for three-quarters of an hour. Strain, if too thick, reduce with boiling water.

OATMEAL GRUEL WITH MILK.

Soak one-half pint oatmeal in quart water overnight. In morning add more water if necessary and boil one hour, put it through a strainer and blend well with about a pint of boiling milk. Boil five minutes, salt to taste.

SUNSHINE ORANGE.

Soak an orange in hot water for half an hour, or until it is heated to the core. The skin will loosen and come off like a glove, and the pulp will be sweet with the sweetness that comes, not from sugar, but from the sun.

BARLEY WATER.

Wash two ounces pearl barley in cold water, boil three minutes, then throw water away. Add two quarts boiling milk, boil till reduced to one quart, stirring often. Strain, add juice of lemon, and sweeten.

COFFEE.

Two tablespoons coffee, four tablespoons cold water, one-half egg. One pint cold water, let it come to boil.

BEEF TEA NO. ONE.

One pound juicy beef cut from round, remove all fat, cut into small pieces, put in earthen pot, add quart cold water, cover close, let soak for one hour, then simmer for two hours. Strain and season.

BEEF TEA NO. TWO.

Mince fine one pound lean beef, put in wide-mouthed jar, cover with water and put cover on tight, set jar into kettle of cold water, boil three hours. Strain and season.

LINSEED TEA.

Boil linsed and water together one hour. In separate dish squeeze two lemons and rind of one cut thin, add two tablespoons white sugar. Strain tea over sugar and lemon.

N. B. A few raisins improve it.

CHICKEN CUSTARD.

Scald together one cup of strong chicken stock and one cup cream, pour it over the well beaten yolks of 3 eggs, and cook in double boiler till slightly thickened. Salt to taste and serve cold in custard cups.

ARROWROOT PUDDING.

One-half pint milk, one desertspoon arrowroot, two eggs, one desertspoon sugar. Butter a pie dish, mix arrowroot with as little milk as possible, then pour over the boiling milk, and sugar and let it cool a little. Drop in the yolks of eggs and beat well into the arrowroot, beat whites to stiff froth, mix lightly, bake five minutes.

N. B. See that the arrowroot thickens slightly before putting it into the greased pudding dish.

CHICKEN BROTH.

Separate chicken at joints, remove all skin and fat, cover with cold water, add teaspoon salt and pepper, one onion. Simmer till chicken is tender, then remove best part of meat, put bones and gristle back and simmer till bones are clean.

Wash and soak two tablespoons rice one-half hour. Strain broth and put it on to boil, again add rice and chicken cut small. Serve with toasted crackers.

CHICKEN FRICASSEE.

Cut the chicken at the joint in pieces for serving, cover with boiling water, add teaspoon salt and pepper, simmer till tender (young one-half hour; old one hour). Remove large bones, dredge them with flour, and brown them in hot butter, serve the chicken on toast or hot platter. Strain the liquid, remove fat and add to it one cup cream or milk and heat again. Melt one large tablespoon butter in a saucepan, add two tablespoons of flour and the chicken liquid slowly. Seasoning—one teaspoon celery salt, one teaspoon lemon juice. Beat one egg, pour the sauce slowly over the beaten egg, stir well and pour over the chicken.

The use of flavors is nowhere seen to better advantage than in the case of invalids who may need "Palate Tickling" to tempt them to eat what is really best of them.

Used Her False Teeth

A popular magazine tells a little story that was not designed as an advertisement for the bakery pie, but may well serve that very useful purpose: "Old Aunt Sally, the highly esteemed cook in a Southern family, was frequently praised for her culinary skill, and, on one occasion, when a number of guests had been to dine with the family, remark was made touching the beautiful appearance of Sally's pie, which showed a very pretty scallop on its edge. Inquiry being made as to how the old lady managed to get such an even design, Sally was summoned to the dining room and the question was duly put to her. The emotions of the guests may be imagined when the old lady replied: "Oh, dat's easy. I jest uses my false teeth."—Baker's Helper.

Recent Additions to the Library of the Pacific Coast Gas Association

TECHNICAL METHODS OF CHEMICAL ANALYSIS. Volume II, Parts I and II. By George Lunge, Ph. D.

English translation from the latest German Edition, adapted to English conditions of Manufacture. Treating of Metals, Illuminating Gas and Ammonia, Coal Tar, Calcium Carbide and Acetylene, etc.

POWER HOUSE DESIGN. By John F. C. Snell.

CONTENTS:

Systems.
Preliminary Notes on the Choice of Site and Type of Plant.
Buildings.
Steam-Raising Plant.
Steam and Feed-Pipe Systems.
Steam Generators.
Various Types of Condensers, Cooling Towers and Auxiliaries.
Internal Combustion Engines: Gas and Oil Engines, Producers and Waste Heat Stations.
Hydro-Electric Power Houses.
Power House Switch Gear.
Some Practical Notes on Electrical Plant.
Small Power Houses and Substations.
Water Tube Boilers.
Velocities in Circulating Water Pipes.
Electricity Regulations (Great Britain) for Factories.
Chimney Cooling Towers.
Tests of Steam Feed Pumps.

EXPERIMENTAL ENGINEERING. By Rolla C. Carpenter and Herman Diedericks.

THE CALORIFIC POWER OF GAS. A Treatise on Calorific Standards and Calorimetry. By J. H. Coste, F. I. C., F. C. S.

CONTENTS:

Changes in the Methods of Using Gas.
Changes in the Manufacture of Gas.
The Positive Testing of Gas.
Relationship Between Illuminating Power and Calorific Power.
Actual Results of Testing the Only Sound Basis for a Standard.
Relationship of Standard to Actual Results.
Methods of Stating Calorific Power.
Existing Calorific Standards.
The Calorific Values of Combustible Gases.
Gross and Net Calorific Power.
Calculation of the Calorific Value of Gaseous Mixtures from the Results of Analysis.
Composition of Gas.
Causes of Variation in Composition of Coal Gas.
Still Water Calorimeters.
Flow Calorimeters.
Sources of Error Affecting the Results of Flow Calorimeters.
Continuous Gas Calorimeters.
Other Types of Calorimeters.
The Choice of Methods and Appliances.

RESUME OF PRODUCER-GAS INVESTIGATIONS, OCTOBER 1, 1904-JUNE 30, 1910. By R. H. Fernald and C. D. Smith, Department of the Interior, Bureau of Mines, *Bulletin 13*.

PHYSICAL AND CHEMICAL PROPERTIES OF THE PETROLEUMS OF THE SAN JOAQUIN VALLEY OF CALIFORNIA. By Irving C. Allen and W. A. Jacobs.

With a chapter on Analysis of Natural Gas from the oil fields of Southern California, by G. A. Burrell. Department of the Interior, Bureau of Mines, *Bulletin 19*.

E. C. JONES, Librarian,
445 Sutter Street,
San Francisco, Cal.

From far-away Milwaukee, Wis., there reaches us a theatrical program upon which is featured the name of Bert Wilson, a former employee of the Pacific Gas and Electric Company, who went East a month ago to try his luck upon the vaudeville stage. He appears among the list of attractions at the Climax Theatre as a character comedian, with an imitation of Harry Lauder in one of his specialties.

PERSONALS

Second Vice-President and Treasurer A. F. Hockenbeamer returned January 20th from a two-months' sojourn in New York City, where he played a prominent part in the big financial transaction with the banking house of J. P. Morgan & Co.

Mr. Hockenbeamer did not let the grass grow under his feet while he was East. He had his eyes open all the while, and he took notes of all he saw. When he got back he spoke words that gladdened the hearts of his associates on the directorate of the Pacific Gas and Electric Company.

"With regard to our Company and its affairs I found a really good feeling existing among the people familiar with the doings of the prominent public-service corporations of the country and, also, those in close touch with matters financial," he said.

"I found, also, that the charges made for service rendered by the lighting companies of the East are, as a rule, considerably higher than the Pacific Gas and Electric Company makes for service of like character, and this, too, in face of the fact that their operations are carried on in the most densely settled section of the United States, where the field of distribution is immeasurably greater, and at the same time, more compact than ours.

"The result of my observations, then, shows up well for 'Pacific Service.' We are on the map, all right."

Mr. Hockenbeamer added that he found two publications issued by the Pacific Gas and Electric Company in great favor among the business men of the East, one the illustrated album giving the history and describing the properties of the Company, the other the monthly magazine. "They are both regarded as high-class publications," he said.

Mr. Hockenbeamer passed a portion of his last day in the Eastern metropolis witnessing the great fire that destroyed the Equitable Life Building. He saw thirty-five fire engines at work, and describes the spectacle as one that will linger in his memory.

On Christmas Day, Mr. Hockenbeamer called upon Mr. John Martin at his hotel in in New York, and found him surrounded by members of his family, having as enjoyable a time as he could away from the delights of Ross Valley.

The wedding of James F. Driscoll, of the Cashier's department, and Miss Emily Lally, formerly stenographer in the Bookkeeping department, took place in this city, Wednesday, January 17th.

The parties immediately interested kept the affair as quiet as possible, but the bridegroom's friends in the Company's service insisted on celebrating. As a result, Driscoll found himself the recipient of a handsome table lamp which will take prominent rank among his household gods.

After the wedding the happy couple departed on a week's honeymoon trip. Driscoll is now at work again and receiving fresh congratulations.

Ever busy Dan Cupid has shot an arrow into the Purchasing Department, and young Cornelius Edward Murphy is stricken with a wound from which he hopes never to recover. The bride-elect is Miss Ethel Walsh, and the engagement was formally announced by the young lady's mother, Mrs. Katherine L. Walsh, at a reception given at the family residence, 606 Third Avenue, January 20th.

PACIFIC GAS AND ELECTRIC COMPANY

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PACIFIC GAS AND ELECTRIC COMPANY

CITIES AND TOWNS SUPPLIED WITH GAS, ELECTRICITY, WATER AND RAILWAY

Service Furnished	Number of Towns	Total Population
Electricity	162	1,049,977
Gas	49	978,167
Water	10	45,825
Railway	1	60,000

Place	Population
Alta	20
[1] Alameda	25,000
[2] Albany	800
Amador City	200
Adams John	25
Alto	25
[5] Auburn	2,375
Agua Caliente	100
Algarado	900
Antioch	3,000
[2] Barber	500
[2] Belmont	350
Belvedere	1,000
Benicia	3,360
[2] Beresford	25
[2] Berkeley	40,000
Biggs	750
Big Oak Flat	20
Brentwood	200
Broderick	200
Brown's Valley	50
Byron	200
[2] Burlingame	4,000
California City	25
Campbell	600
Centerville	1,000
Centerville	20
[2] Chico	13,000
[2] Colma	3,500
[2] Colusa	1,500
Concord	1,500
Cement	1,500
[5] Colfax	500
Cordelia	150
Corde Madero	350
Crockett	2,500
Crow's Landing	375
Daly City	25
Davis	750
Decoto	350
de Sabla	25
[5] Dixon	1,000
Dobbins	50
Davenport	1,000
Drytown	20
Durham	500
Dutch Flat	500
[2] Easton	300
[2] East San Jose	1,660
Eagle's Nest	50
Elmira	150
El Verano	400
[2] Emeryville	5,000
Encinal	100
Fairfield	834
Forestville	100
[1] Fresno	30,000
[2] Fair Oaks	250
Folsom	1,800
Glen Ellen	500
[2] Grass Valley	4,500
Gridley	1,800
Groveland	25
Guerneville	500
Hammonton	500
[2] Hayward	4,000
[2] Hillsborough	1,000
Ignacio	100
Ione	900
Irvington	1,000
Jackson Gate	20
Jackson	2,035
Kennedy Flut	20
[2] Kentfield	250
Knight's Landing	350
Lake Francis	5
Lathrop	300
Live Oak	200
Livermore	2,250
Los Gatos	3,000
Larkspur	600
Lincoln	1,400
[2] Lomita	100
Los Altos	500
[6] Loomis	400
Martinez	5,000
Martell	150
[2] Marysville	7,000
Mayfield	1,500
[2] Menlo Park	1,500
Meridian	300
[2] Millbrae	300
Mill Valley	2,500
Mission San Jose	500
Mokelumne Hill	150
Monte Rio	50
Mountain View	2,500
Mare Island	500
[2] Napa	7,000
[2] Nevada City	2,700
New Chicago	10
Newark	700
[6] Newcastle	750
Newman	1,000
Niles	800
Novato	250
[2] Oakland	230,000
[2] Palo Alto	6,300
Pacheco	200
Penryn	250
[2] Petaluma	5,500
[2] Piedmont	1,720
Pinole	1,500
Pittsburg	2,372
Pleasanton	2,000
Point San Pedro	20
Port Costa	6060
[2] Redwood City	3,200
[2] Richmond	10,000
Rio Vista	884
[6] Rocklin	1,000
[5] Roseville	2,600
Rodeo	500
[2] Ross	500
[4] Sacramento	60,000
San Andreas	200
[2] San Anselmo	1,500
[2] San Bruno	1,500
[2] San Carlos	100
[2] San Francisco	416,912
[2] San Jose	30,000
[2] San Leandro	4,000
San Lorenzo	100
[2] San Mateo	6,500
[2] San Quentin	2,500
[2] San Rafael	6,000
San Pablo	1,000
Santa Clara	6,000
Saratoga	50
[2] Santa Rosa	12,000
[2] Sebastopol	1,200
Sausalito	2,500
Smartsville	500
[2] South San Francisco	2,500
[2] Stanford University	2,600
Sonoma	1,200
Stege	1,000
[5] Stockton	30,000
Suisun	1,200
Sutter Creek	1,500
Sunnyvale	1,500
Tiburon	400
Tormey	20
Towle	100
Tracy	1,200
Vacaville	1,200
[2] Vallejo	15,000
Walnut Crek	350
Warm Springs	200
Wheatland	1,400
Winters	1,200
[2] Woodland	3,200
Yolo	400
[2] Yuba City	1,200
Total	1,104,977

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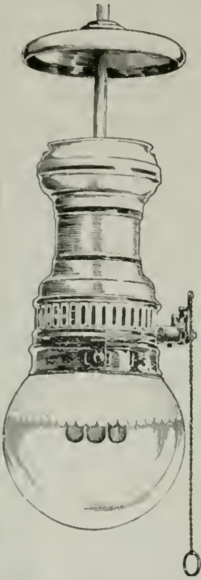

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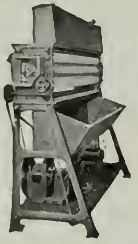

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PACIFIC GAS AND ELECTRIC MAGAZINE

PACIFIC GAS AND ELECTRIC COMPANY

Published Monthly by
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO

VOL. 3 FEBRUARY, 1912 NO. 9

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For further information and prices, kindly communicate direct with Mr. GEO. C. ROBB, Superintendent of Supplies, 445 Sutter Street, San Francisco.

Pacific Gas and Electric Magazine

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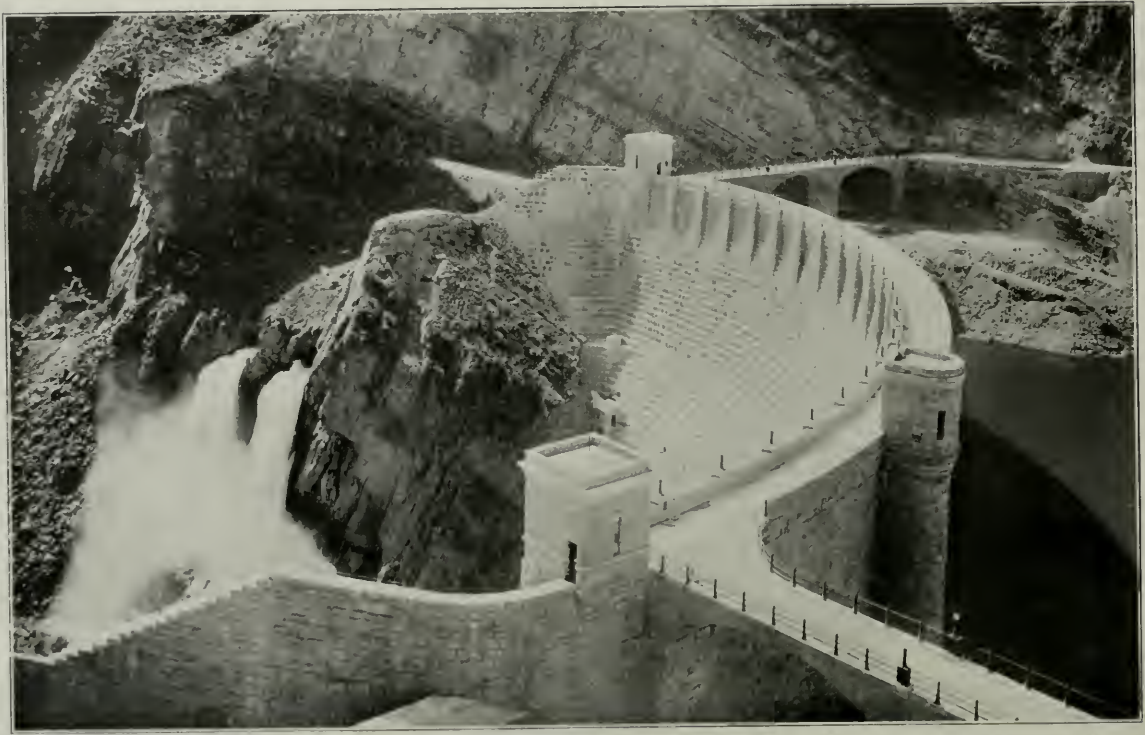


The Great Roosevelt Dam, in Arizona. It is an important feature of the Salt River project and represents an outlay of $3,500,000. It meaeures 284 feet in height from the lower foundation, and has 220 feet in depth of available storage.

PACIFIC GAS AND ELECTRIC MAGAZINE

VOL. III FEBRUARY, 1912 No. 9

State Capitol at Phoenix, Arizona

Arizona, Our New Sister State

By FREDERICK S. MYRTLE, Manager Publicity Department.

F. S Myrtle

This month of February in the year of our Lord, 1912, witnessed the formal admission of Arizona to the sisterhood of States and the completion of the chain that now stretches from the Atlantic to the Pacific Coast.

At high noon on the 14th of the month the first Governor of the new State was inducted into office in the Capitol at Phoenix. It was an historical event that took place on a historical day, for not only is February 14th known throughout the world as St. Valentine's Day, but this year it was the fiftieth anniversary of Arizona's admission into the Southern Confederacy. On this day of days in 1862, the President of the Southern Confederacy, Jefferson Davis, issued his proclamation announcing the admission of Arizona. Nothing came of it, of course, for immediately following the proclamation troops were thrown into Arizona from the adjacent State of California, and when, later on, President Lincoln conferred territorial government upon her she was pleased to become an integral part of the Union.

And now Arizona takes place in the ranks and has a star all to herself upon the Union Jack of America. This honor is coming to her, for the Arizona of today resembles the Apache-ridden desert of a quarter of a century ago about as much as the summit of the Sierras in winter time resembles a San Joaquin Valley poppy-field in the spring.

Time was when the hideous Apache was abroad in all his war-paint and savagery, and the life of the settler in Arizona was precarious to a degree. Today the Apache is an humble individual, who toils with his hands for an humble wage. His children romp and play and learn from books in a school near Phoenix that is Arizona's pride. The desert has taken on a new front. Last fall the writer was one of a party of Panama-Pacific Exposition boosters on a visit to Arizona on the occasion of the State Fair. Where once was a wilderness grew oranges and other fruits. Our party drove some thirty odd miles mountainwards to the great diversion dam, where the waters of Salt River first gathered in the great Roosevelt Dam—forty miles further on are diverted into channels that flow east and west and make farming possible. What we saw there told the story, and there was evidence in plenty at the Fair Grounds, where we found fruit and dairy products on exhibition that rivalled the best efforts of our beloved Golden State nearby.

Irrigation has done and is doing for Arizona the work that has transformed a bleak, trackless desert into a land flowing with milk and honey. The Salt River project cost $10,000,000, of which the great Roosevelt Dam figures at $3,500,000, but how much return it will bring to the people of Arizona no man can say. For the benefit of engineers and other persons who delight in statistical information it may be said of this dam, a picture of which is given here, that it measures 284 feet in height from the lower foundation, is 168 feet thick at base, and 16 feet thick at the crest. It has 220 feet depth of available storage; is 780 feet long at level spillway. The depth of spillways is 20 feet, and their capacity in second feet is 123,000. The depth of bed rock is 36 feet, the capacity of reservoir in acre feet is 1,300,000, the area of drainage basin 5,756 square miles, the area of reservoir 16,320 acres. There is an amount of masonry at the dam figured at 340,000 cubic yards, while the amount of cement is placed at 250,000 barrels. The diversion tunnel is built through solid rock on side and is 10 x 13 feet in size. The average power developed at the Roosevelt Dam is 6,000 horsepower, and the capacity of the power canal is 250 second feet.

To the traveler from the East and abroad, Arizona is as picturesque as ever. The Indians are there still, and the tourist can revel to his heart's content in Navajo blankets, bracelets and rings, Apache and Pima baskets and specimens of Maricopa pottery. But the "wild and woolly" has gone out of the life of Arizona, as a visitor to the new hotel which opened in Phoenix last fall may see for himself. So we take off our hats and shout:

"Hail to our new sister! God bless her!"

The H. W. Johns-Manville Company, whose headquarters are in New York City, makes the announcement that owing to increasing business in Louisville, Ky., it has been found advisable to move the company's offices in that city from the Lincoln Savings Bank Building to more spacious quarters in the Paul Jones Building.

Work on the Panama Canal

Now that there has been received from Washington the glad news that President Taft has formally invited the nations of the world to participate in the great International Exposition to be held in San Francisco in 1915, public interest is aroused to a greater extent than ever before in the world's great engineering feat, the completion of which our Exposition is to celebrate—the Panama Canal.

It happens that in the employ of the Pacific Gas and Electric Company are two experts who are familiar with certain phases of the work that is to result in the joining of ocean to ocean. We venture to think that their contributions to this number of the magazine will interest its readers not a little.

Mt. Hope Dry Dock and Wharves — Colon Docks

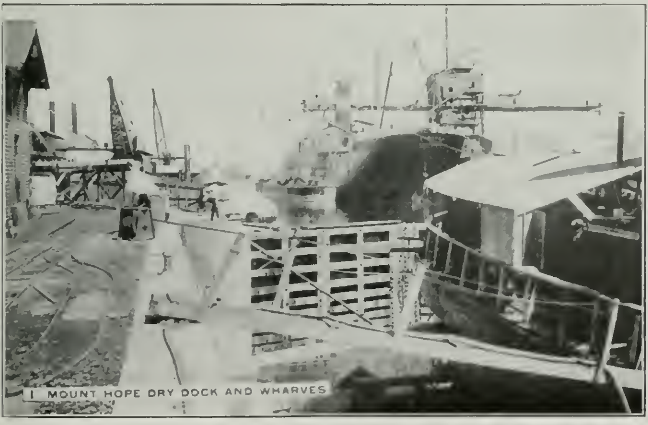
By J. G. BUBB, Office of Property Agent.

J. G Bubb

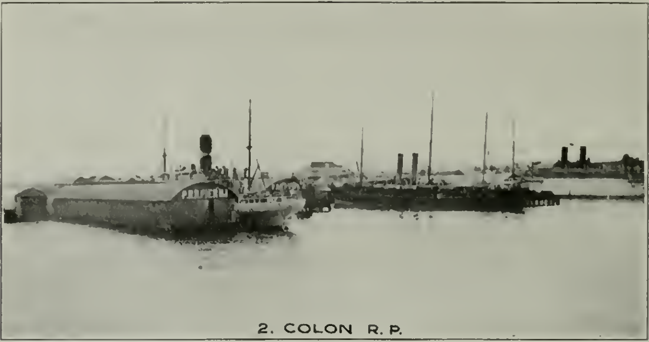
In the foreground of the first view is shown the dry dock at Mt. Hope, located about one mile from the Atlantic entrance to the Canal. Here the vessels comprising the dredging fleet engaged on the Atlantic side of the Canal are docked whenever repairs are required. It is sufficiently large to accommodate a 5,000-ton ship, and quite extensive repairs can be made here in connection with the large marine shops adjacent to the dock.

The large ship shown in the view is moored at the coal wharf, where all of the coal used by the canal fleet, the Panama Railroad Company, also that required for all other purposes on the Canal, together with that which is transported across the Isthmus and delivered to ships plying the Pacific Ocean, is unloaded by means of a large "Brown Hoist." Thousands of tons are in storage at this wharf and at points along the Canal at all times.

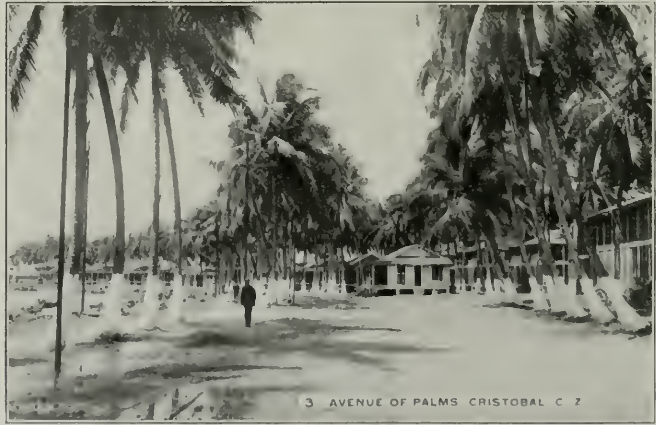
In the second view are shown the piers at


1 MOUNT HOPE DRY DOCK AND WHARVES

Colon, where the ships of the Panama Railroad Company, United Fruit Company, Royal Mail Steam Packet Company, Hamburg-American Line, the French Line, and all vessels calling at this port are berthed. There are four piers in Colon, one at Cristobal, and one at Mt. Hope, and thousands of tons of freight and hundreds of passengers destined for the Canal and South Pacific ports are transferred from these piers each week.


2. COLON R. P.

The last view shows a street along the waterfront at Cristobal, the American town at the Atlantic entrance of the Canal. This street, facing the ocean and lined with tall Royal palm trees, is a very beautiful spot. The smaller houses along this thoroughfare are relics of the French days, and when the Americans took charge these were remodeled and repaired and make very comfortable and much desired quarters for small families.


3 AVENUE OF PALMS CRISTOBAL C Z

Application of Electric Power to Excavating on the Canal

By H. H. BUELL, San Jose District.

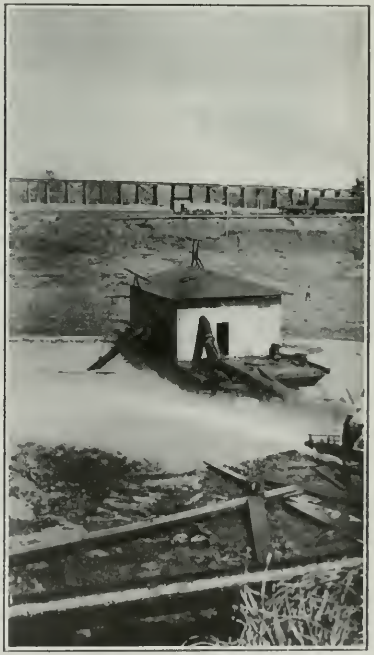
H. H Buell

The building of the Panama Canal has offered the engineers of the United States government many opportunities for experimenting on a large scale, opportunities not possible elsewhere. The method of Hydraulic Excavation as employed in the Pacific Division at Miraflores was what might be called such an experiment, and while it was not of great magnitude as compared to the entire work, nevertheless it was large enough to receive some attention from the engineering world. Excavating by hydraulic methods has been accomplished successfully at Portland and Seattle on this coast, but conditions at these places were much less severe and, in fact, were the direct opposite of those found on the Panama Canal.

The problem was this: It was required to excavate a section of the canal channel for a distance of a little over a mile south of and including the lower locks at Miraflores. This section was for the most part below mean tide level. The excavated material had then to be raised approximately 50 feet to fill the core of the West dam. Owing to the fact that the material to be removed was, for the most part, partially saturated, steam shovels were out of the question owing to the high cost of maintenance. It was decided, therefore, to employ hydraulic means as being the most economical.

The hydraulic plant was divided into two parts: First, a central pumping plant which supplied water at a pressure of 150 pounds per square inch to a number of hydraulic monitors, used to disintegrate the material and wash it into sumps, and, second, excavating pumps used to lift the material from the sumps and force it through pipe lines to the dam.

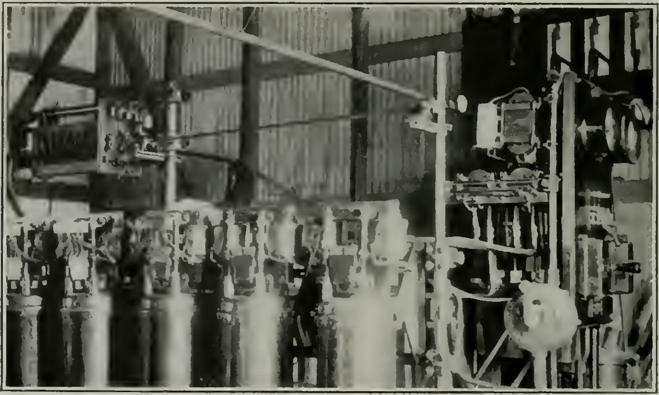
The pumping plant was located on salt water as near to the center of the area to be excavated as possible. The plant consisted of 4 units, each a twin, horizontal, double-acting pump with triple-expansion steam ends. The water cylinders were each 24-inch by $24\frac{1}{2}$-inch and each unit was designed to furnish 7,500 gallons per minute against a head of 150 pounds per square inch. Steam was furnished by Babcock & Wilcox boilers fired by oil stored in two tanks located on the hill in the rear of the station. These tanks were



Monitor and Excavating Barge

kept full by a branch of the oil pipe line which crosses the Isthmus. Owing to the 20-foot tide at the Pacific end of the Canal, the plant, with the occasional exception of one unit, was rendered inoperative at low water. The monitors were of the type employed in hydraulic work on this Coast. At first 6-inch nozzles were used but when these were found to supply too much water 4-inch nozzles were substituted.

The excavating apparatus consisted of special 18-inch dredging pumps direct-connected to 650 horsepower induction motors. The pumps were designed to lift 10,000 gallons of 10 per cent solution per minute, and discharge it against a head of 65 feet. The induction motors were of the squirrel-cage type, 2,200 volts, 3-phase. Current was supplied by the power house at Miraflores, transmitted overland by an overhead line and to the barges by armored submarine cable. The motors were started by applying half normal voltage and after full speed had been reached, increasing the voltage to normal. For this purpose a starting apparatus was employed consisting of auto-transformers, oil switches, and preventive coils. In addition to this apparatus there was a 5 horsepower induction motor belted to the priming pump and supplied by a 3—0 transformer. The whole was mounted on a reinforced concrete barge, approximately 30 feet by 60 feet and 6 feet deep. These were among the first concrete barges ever built and subsequently proved unsuited to this class of work.



Electrical Apparatus Inside Barge

On account of the moisture, which is ever present in the atmosphere of a tropical country such as the Canal Zone, trouble with the electrical apparatus was experienced from the start. This, however, was partially due to the rough treatment which it received on its arrival. The motors and starting apparatus were left exposed for several months. During this time perhaps 30 inches of rain fell and it is easy to imagine the condition of the insulation as a result. However everything was mounted on the barges and covered with canvas and dried out by means of gasoline torches for several weeks before being started. The starting apparatus was originally automatic, but proved a continuous source of annoyance, so a hand-operated apparatus was substituted.

Because of the fact that the centrifugal pumps had to be started on full load, the drain on the power house was enormous each time a pump was started. At that time the motors drew something like 300 per cent overload for several seconds. Consequently means were provided to prevent two barges starting up at one time. The salt spray from the nozzles, which often played close to the barges, settled on the windings of the motors and left a deposit of salt there after the water had evaporated. The motors ran 24 hours a day during the week, but were shut down over Sunday. During this time the salt drew moisture from the air so that it appeared in large drops on the insulation. As a consequence, when the motors were started up on Monday morning, it was not an uncommon occurrence for one of them to burn out. It was not long, therefore, until the motors were covered and kept hot by torches during the 24 hours of inaction.

The monitors were handled by negroes who could not always be depended on. Several times, due to the negligence of the operators, the monitors became unmanageable and the stream, in its gyrations, struck the flimsy structure on the barge, breaking in the whole side or end, as the case might be. The resulting damage can be imagined. It was naturally impossible to get to the controller to shut down with that 6-inch stream playing in its vicinity, so it would be only a short time until there was a general short and the power house breaker would go out. The sensation was far from pleasant even behind such vantage points as offered, the pump or thrust-bearing pedestal. The wire of the 2,200 volt circuits in the control apparatus was 4—0 rubber covered, but the rubber served its purpose only a short time. It was not long before a piece of canvas laid over the wires would be set on fire by the creepage across it.

The concrete barges were subjected to extremely rough handling. The vibration of the pump was enormous at times, as when several rocks of about 10-inch in diameter would lodge in the runner of the pump which was rotating 480 revolutions per minute. This caused the entire barge to rock as it would be several seconds before the pump could be stopped. The runners of the pumps could pass stones up to 6-inch in diameter. The barges were lowered by playing the streams from the nozzles under them and washing out the material. This proved entirely satisfactory when the material was all soft. One barge, however, happened to be resting centrally over a very large boulder and when all the other material had washed out even the steel reinforcement could not stand the strain resulting in the barge breaking in half. The other two barges suffered in similar manner, each having its bottom stove in. The pumps were then moved ashore and mounted in advantageous position upon heavy timber foundations.

These are only a few of the difficulties encountered which made the operation and maintenance of such a plant extremely costly. They serve to show to a small extent what Uncle Sam's engineers have to overcome in the building of the Panama Canal.

Gentleman—There is some mistake in this gas bill.

Gas Collector—No, sir; the bill is all right. It is according to the meter.

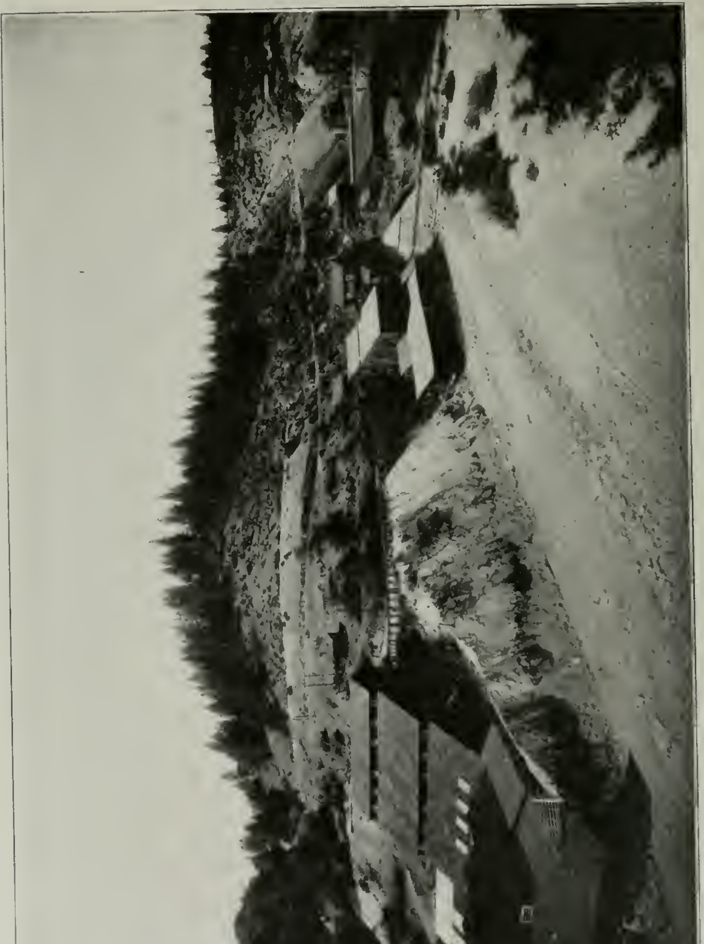
Gentleman—It's very strange. I certainly burned more gas than that last month.

Gas Collector (turning pale and edging toward the door)—Very well, sir—very well. Don't get excited, sir; keep quiet, calm yourself. Everything will be made all right, I assure you, sir.

The collector bounded down the steps and shouted for help. Four policeman responded, and, moving cautiously up the stairs, secured the maniac and got him safely to the asylum.

But little hopes are entertained of his recovery.

San Francisca (Cal.) *Chronicle*, Feb. 4, 1912.



Scene of the Champion Mine, near Nevada City

Starting the New Plunger Pump at the Champion Mine

By GEORGE SCARFE, Superintendent Nevada Power Division.

George Scarfe

On the afternoon of December 12th last, in a cavern-like chamber blasted from a solid rock 1700 feet on the incline and 900 feet below the bed of Deer Creek, the writer was one of a party gathered to try out a piece of machinery that had occupied the heads and hands of many in the making for some four months past.

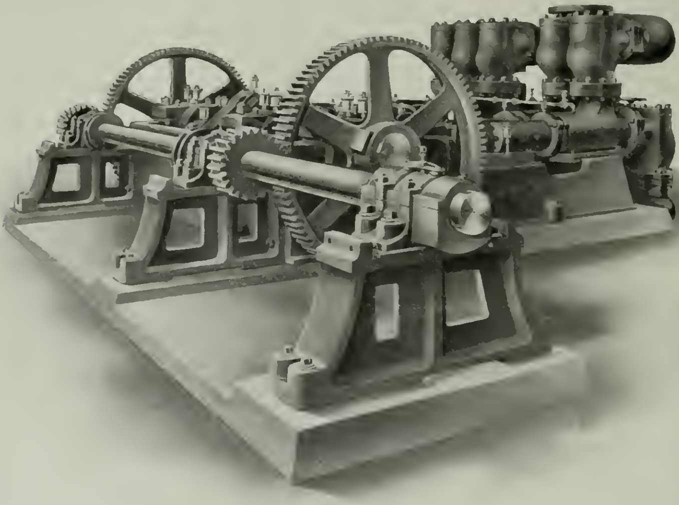
The scene was the Champion Mine, near Nevada City; the piece of machinery to be tried out was a five-throw plunger pump, to be driven by electric power supplied from the Pacific Gas and Electric Company's substation nearby. It was an event of the greatest importance to Nevada City and the neighborhood, as also to the mining industry throughout the state.

In the dimly lighted room stood the pump, as yet a massive but inert combination of iron, steel and bronze, quiet as the surrounding rocks. Behind it, and connected by a water-proof belt thirty inches in width, stood another but smaller machine from which six wires could be seen connected with a small marble panel, in one corner of the room. On the panel stood a small lever conrtolling a switch on the back of the board above an instrument, attached to which were three wires leading to a pot-head, and appearing like a triple-tongued head from which could be seen a serpent-like form, that, if traced, would lead one around this underground chamber and up the shaft some 1700 feet to a small building, where it connected, through a time-limit switch, to a bank of three transformers. These, in turn, were connected with the electric lines leading to Colgate and other power houses of this system.

In preparation for the starting of this great pump, men were seen moving here and there, testing all the parts, giving a last searching look at pipes and valves, and inspecting the motor and controller boards. Then, at a given signal, the Superintendent of the mine threw in the switch lever, and the object that an instant before had been but a motionless mass of metal, sprang into life, as it were.

Pacific Gas and Electric Substation at the Mine

The great belt traveled at the rate of almost a mile a minute, gears whirred, shafts revolved, and, in turn, pulled and pushed on five massive arms, which threw in and out as many plungers, causing one almost to think that a scene from Dante's "Inferno" was being enacted. Presently there came to our ears the sound of water discharging from a pipe, and we knew that the work of developing the Champion Mine, and the extraction of the precious metal, for which we had labored, would now go on uninterrupted. For now the large five-throw plunger pump, driven by power transmitted through slender wires over canyons, mountains, forests and fields, down through a shaft three feet by four, to the 250 horse power induction motor, was doing its duty in keeping the mine free from water. voltage is transformed at the mine to 2300, the pressure being carried underground. The use of transformers between the 4000 and 2300 delta is considered a protection against lightning, and, as the primary side has taps for 4000-3800 and 3600, the necessary pressure can be maintained on the pump motor in the event of low primary voltage from any cause.



The plunger pump that keeps the mine free of water

As to the pump itself, the weight alone is 43,000 pounds, and its capacity 750 gallons a minute, against a head of 900 feet. The driving motoı is 250 horse power, 2300 volts, running at 600 revolutions per minute, and is connected by a 30-inch belt to a 8-foot pulley, which drives two pinions, meshing with two spur gears on the crank shaft, to which are connected the five inch plungers. The cable is 3-conductor 00 cambric insulator, lead covered and steel armored.

The Pacific Gas and Electric Company has erected a sub-station near the mine, transforming from 2300 volts to 4000, which last

Great credit is due to the engineers in charge of the work, to whom this starting was a wonderful demonstration of the application of electric power to deep mine pumping, it was they, who, under the direction of Mine Superintendent A. B. Foote, carried out this mass of detail to such complete success. Credit is due also to the Taylor Foundry and Engineering Company of Grass Valley, who built the pump; and to Mr. Halstrom, electrician of the North Star Mines Company, whose careful and skillful work in installing the electric end made it possible to start without electrical trouble of any kind.

Profits and Progess

By F. G. B.

THE other day, while going to Los Angeles on the "Sunset," I met an old friend of mine whom I had not seen since our college days, and we naturally began talking of old times and what we had done since those happy days. My friend, being a man of ability, has advanced to the position of Associate Professor of Mathematics in one of our largest Universities, and, as he had to struggle hard from a small beginning, I naturally congratulated him upon his success and predicted a bright future for him.

The Professor said: "We used to think you were to follow teaching, but I understand you have become a "corporation" man, and are doing quite well. But, of course, these big concerns make a great deal of money out of their stocks, which don't cost them anything, and naturally they can afford to pay well." I replied that a corporation might issue stock, yet it could not make that stock worth much on the market unless there was some real value in it. "Water, you know, seeks its level," I said, "and this is true of water in stocks as well as H_2O."

I could see, however, that he had an idea strong in his mind that in some mysterious way the Public was made to pay interest on stock of no value, and so I was not surprised when he said: "The companies should earn interest only on the money actually put into the property."

"But," said I, "you must know that the stock of a company very often represents the future value of Property, Rights-of-way, Processes, Patents, Accumulated Surplus reinvested, Going Business, Business Ability, etc., and that these values continually grow as the business grows and gradually build up the equities in the stock until, sooner or later, the stock is worth its full face value." And I instanced the case of the Southern Pacific Railway, which company acquired property, rights-of-way, terminals, etc., fifty years ago at very small prices compared to their value today. I went on:

"You know, also, that you cannot ordinarily, honestly mortgage a property for more than its worth, and generally the mortgage is a great deal less than the value of the property. Stock in a company, or shares, as they should preferably be called (because they really represent the proportionate interest of each share holder or stock holder in the company and its future), represent both a possible future asset and a more certain present liability. And you and I, when we went to college and lived in a back garret, cut lawns and wore threadbare clothes, were then doing just what every honest company does when it organizes and developes. We were investing money in ourselves, spending money and time in order that our future equity, *our stock*, might be increased—that is, we were hoping for profits in the future. Practically every new company, building on a firm, safe foundation, must go through the same kind of experience, and by foresight, ability and determination, try to build up a business which may pay dividends and of which they may be proud."

"You will not," I said, "admit that if you and I open up a hat store in San Francisco our earnings should be determined solely by the money we have put into the business."

"No," said the Professor, "but the Public Service business is different—it doesn't require very much of anything except money and the consent of the Public."

"In that case," I said, "it would appear that the Public had better take over these Public Service Companies; then we could invest in their bonds, draw our interest and have nothing to worry about. But, as a matter of fact, I would be willing to take any Public Service business and operate it privately at no greater cost to the Public, and out of the saving I could pay very large dividends. Again, suppose you leave the companies privately owned, but allow no profit (only operation costs and interest on money invested), what incentive is there to *reduce* operating expenses, to install machinery, to improve service, or to reduce costs? And finally, Professor, you know the progress of any business is largely measured by the profits to be made."

"Let us take the case of the day laborer, suppose we allow him just enough to keep him and allow him no profits—that is, allow him only his operating expenses, as you propose for the Public Service Corporations, how can that man hope to advance—to save enough to buy a home with five or ten acres, or to start some small business? Or, take your own case, Professor, and suppose the University paid you only enough to keep you (you are in the Public Service, you know), how would your progress be affected? How could you take one year in Europe out of every five to study and prepare that book you are writing? You do these things, Why? To advance, of course, and that you may earn more salary. But, take away the profit on your salary and what becomes of your progress?"

"Well," said the Professor, "I think there is a great deal in what you say, but I never looked at it that way."

"Yes," said I, "the Public does not know because it does not think about it. But, you know, the most important thing for any of us, Laborer, Teacher, Farmer, Mechanic, Clerk, Capitalist, Corporation, City, County, State, Country and the World, is that we progress and develop, and to do this profits are as necessary as fertilizer or nitrogen to plant life. This principle is the basis for all progress in one way or another, and, conversely, all Profits should mean Progress—that is, the desire for profits should be to promote and insure further progress. Our patent laws recognize the principle that Profits mean Progress, and Edison, Bell, The General Electric Company, The Steel Corporation, the men who develop the electric transmission of power, these and many others have done great things for the people—in the expectations of profits, of course—but if we take away the hope of profits our progress ceases. Profits are necessary for Progress, and our community of interest demands Progress."

"I begin to believe you are right," said the Professor, as he bade me good night.

Lamps A Part of the Service

Judges of Debate in Electrical Development League Decide in Favor of the Central Stations

THE February meeting of the newly organized Electrical Development League took the form of a luncheon in the rooms of the San Francisco Press Club, and was noticeable for an interesting discussion upon an important question, to-wit:

"Resolved, that it is in the best interest of the Central Stations to sell incandescent lamps."

Before an assemblage numbering nearly one hundred this question was argued earnestly and with formality, for Prof. C. L. Cory of the University of California, Jas. Redpath and George J. Henry, Jr., had been appointed judges of the debate. The two sides were about evenly represented, the affirmative being taken by George C. Holberton, Frank Leach and Stanley Walton of the Pacific Gas and Electric, and Wm. F. Neiman of the City Electric Company, while Vanderlynn Stow, R. D. Holabird, Jos. Thieben and Andrew Carrigan, all electrical supply men, urged the negative side of the question. These latter presented their case first, the gist of their argument being the contention that it was no part of the business of the Central Station to deal in supplies, to say nothing of their injuring the supply business by knocking prices.

The Central Station men urged the necessity for the sale of incandescent lamps in order to give the consumer proper service. They contended that, although they charged for the electricity sold by meter registration, they were in reality in the light, heat and power business, and, therefore, were justified in making such installations as went to complete the service.

The debate resulted in a victory for the Central Stations, the judges being unanimous in their decision. Prof. Cory made a speech in the course of which he said: "It is purely a matter of economics and how the consumer shall be given the best service possible."

IN MEMORIAM—EDWIN HAWLEY

Great Man, Great Organizer, Whose Busy Life Ended Suddenly

On the first of February there died in New York City a great man and a great organizer, Edwin Hawley.

To the world of commerce he was known as the President of the Minneapolis & St. Louis Railroad, and a Director in several more enterprises of the kind throughout the country. To Californians of the present day he was known through his connection with the Great Western Power Company, of which corporation he was President up to two months before his death. But these are merely categorical particulars of the personal interests of a man who, apart from all else, merits the consideration of the world from the object lesson the story of his busy life affords.

By sheer grit and force of energy he raised himself from the humble position of office boy on the old Erie Railroad to that of a great railroad magnate, whose name has been enrolled on the tablets of fame along with such men as Huntington, Harriman, Gould and Hill. He was Collis P. Huntington's right-hand man in the Southern Pacific, and there perhaps he gained the experience which enabled him to launch out along independent lines. It was during his association with Huntington that he got hold of the Iowa Central and Minneapolis & St. Louis roads. He was their President long before he resigned as Assistant Traffic Manager of the Southern Pacific in New York.

Hawley gave Huntington the benefit of his mighty brain, and Huntington in turn supplied the sinews of war for several of Hawley's campaigns in the railroad field.

He died at sixty-one years of age and a bachelor. Nervous indigestion, brought on, no doubt, from overwork, robbed the country of one of its greatest men of enterprise, when under ordinary circumstances there should have been many years of usefulness yet left to him. He has left a gap in the ranks of the foremost.

F. S. M.

A Leap Year Leap, and Its Result

All readers of the Pacific Gas and Electric Magazine are aware that this is Leap Year, and that the month of February is allowed one extra day to give the fair sex additional opportunity to take the initiative in affairs of the heart.

Those of our male readers who are married may view the situation with amused indifference; those who, so far, have escaped the matrimonial net may regard it with alarm. But one and all, we trust, will appreciate the following contribution to our magazine. It hails from the Bookkeeping Department. The young lady's proposal appears to us a trifle familiar, but the recalcitrant swain's reply, we are assured, is quite original. [ED.

SHE

San Francisco, Cal., Jan. 31, 1912.

My dearest friend and kindest Sir:
I send you this your love to stir.
'Tis you I've chosen first of all,
On whom to make a Leap Year call.
Your hand I do not ask in jest
But hope you'll grant my fond request,
And send me back without delay
Your answer, saying "Yea" or "Nay."
But if you should my love decline
Nor wish your hand to join in mine,
Then you must Leap Year's law obey
And down to me Five Dollars pay.
Besides, kind Sir, a handsome dress,—
I'll ask no more, I'll take no less.
Perchance you think this letter funny
But, I'll have either man or money.
So now you send me your reply.
Wed me, I'll love you till I die,
And if you think I am a dandy
Send me a box of Maskey's candy.
Of course, my name you truly guess
So all I give is my address.

With all sorts of love, wishes and kisses, I am,
A SILENT ADMIRER.

23 Prospect Street, c/o Love Cottage.

HE

I received your proposition, but really, am so shy
That to think of matrimony, with fright, I think I'd die.
The honor I appreciate, but really it's a shame,
For such a lovely lady to wish to share my name.

Money or Matrimony, would be balm to your dear heart?
Well, I cannot think of marriage and from money cannot part;
So I'll have to owe the five spot and for the rest, I guess,
You just can fool the tailor and have him charge the dress.

But do not be discouraged at failure in this match,
For the year is very young yet and hundreds you can catch.
Just cuddle up to Cupid and he will surely fan
The spark of love into a flame in the heart of some fine man.

I will be,
Your Brother,
FUSSY.

Turbine A Titan of Capacity

WITHIN the last few days the Pacific Gas and Electric Company of Central California has installed and put into operation the largest steam turbine on the Pacific Coast. The turbine is located at Station A in San Francisco and has a rated capacity output of 15,000 kilowatts or 20,000 horsepower. Such statements of power rating do not convey to the average reader the enormous energy that is being developd by this modern Titan.

Perhaps we can get a better conception of the prodigious electrical supply which is capable of being generated by this monster when we say that a string of horses, six abreast and seven miles long, working to their utmost could but equal the energy of this single, modest unprententious, cylindrical-shaped mechanism. Indeed, could we neglect for the minute the question of line drop in the wires, this one unit would be capable of lighting a string of 16-candle power lamps placed only 220 feet apart that would encircle the globe. A great white way stretching from Yellowstone Park, through Spokane, Seattle, San Francisco, Yosemite Valley and Los Angeles with a double row of lights, 25 feet apart, could similarly be lighted. So far as power is concerned our novelty managers of the Panama-Pacific International Exposition could, by means of this turbine, generate sufficient energy to deliver a sightseer to the moon and back every three minutes.

For years the advance of the steam turbine was hindered, due to the fact that, for maximum efficiency, speeds approximating 25 miles a minute were necessary. The modern inventor has, however, overcome this difficulty. The steam within the turbine cylinder is now expanded through several stages, six in the case of the turbine above referred to, and the consequnce is, that maximum fficiency is obtained at far lower speeds.

It is interesting to note, that if an observer were perched upon one of the tiny buckets in the periphery of this present monster turbine, he would pass through a distance of some six miles a minute and could he hang on for three days he would outdo Nellie Bly in her classis foreign visitations, for in this brief time he would travel a distance equal to a trip around the whole world.

Such concentrated powers are for the human mind almost unconceivable. To this massing of energy-generating mechanisms, nevertheless, unquestionably points in approval the index finger of modern power plant economy.

From *Journal of Electricity, Power and Gas*, February 10, 1912.

"Pacific Service"

REGARDING COURTESY.

POINT 1.—The measure of respect you show to other people is the measure of respect you feel for yourself.

POINT 2.—Courtesy is an obligation, an indicator, an introduction, a passport, a lesson, an influence, an opportunity, an investment, a peace-maker and a pleasure.

POINT 3.—Courtesy is something the public has a right to expect. It is doing and saying the right thing at the right time, in the right way.

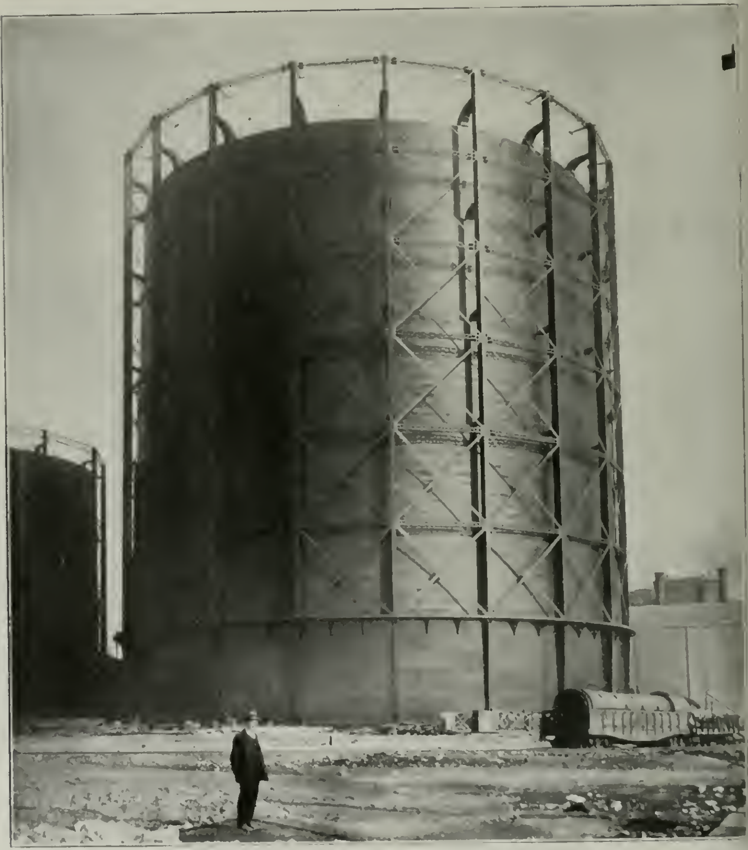
POINT 4.—*It raises your standing with the Company.*

POINT 5.—Boost the service of this Company by always being courteous.

"Brevity may be the soul of wit, but there is nothing humorous in a short answer."

"PACIFIC SERVICE."

(Meaning in addition to the best possible physical service in gas and electric supply, an unruffled, polite, placid, businesslike treatment of the consumer.)



Five-Million-Foot Gas Holder erected for the Pacific Gas and Electric Company, at the Potrero Gas Works, San Francisco, by R. D. Wood & Co., Philadelphia. Frank A. Fitzgerald, Constructor.

The illustration compares the new holder with its 1,000,000-foot neighbor that for years was the biggest thing at the Potrero. Now workmen look upon the once dizzy height of the latter with something akin to derision, and actually have to be cautioned against performing feats of daring when scaling its guide-frame.

View of the Gas-Works from the Big Holder

The New Storage Holder at the Potrero Gas Works, San Francisco

By E. C. JONES.

E. C. Jones

For many years the gas supply of San Francisco has been initially fed from a single storage holder located at the Potrero Gas Works and having a capacity of 1,000,000 cubic feet. To the uninitiated this would seem to be a very large holder, but during the winter months, when the output of gas is as much as 15,000,000 cubic feet a day, it's entire capacity is poured into the city mains every forty-eight minutes for a period of three hours.

This large delivery of gas during certain hours of the day is called the peak output, and represents the increased demand for gas during the preparation of the three meals of the day, breakfast, luncheon and dinner; and in addition to this, during the winter months the lighting load overlaps the cooking and heating load, owing to the earlier time of sunset. So that, for approximately three hours

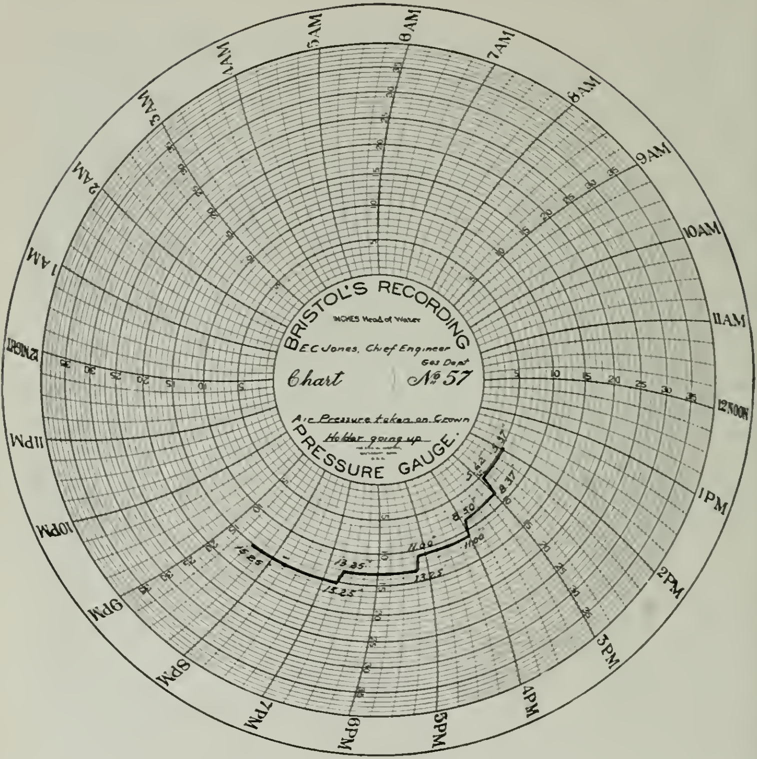


Chart 1. Air-Pressure at Crown of Holder.

during and following the preparation of the evening meal, the output of gas is at its greatest.

It must not be understood that the holder is emptied of gas during this time. As a matter of fact, it remains almost stationary, because the gas-generating apparatus nearby is able to supply the city's demand. But should an interruption occur, due to an accident to the generating apparatus, the gas stored in the 1,000,000-foot holder would last only forty-eight minutes during the peak. This is merely one of the gas man's worries.

So, when it was decided to construct a 5,000,000-foot gas holder at the Potrero Gas Station to supplement the other, it can readily be imagined what a relief to the gas-generators, and other manufacturing apparatus that meant, and what an insurance it promised against accidental interruptions to the service. For this new holder would contain enough gas to supply the city for four

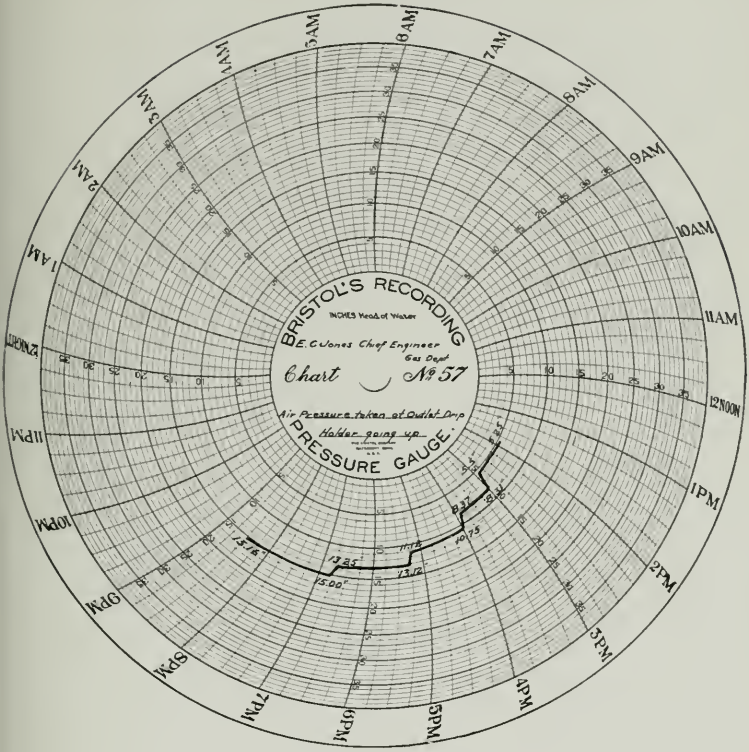


Chart 2. Air-Pressure at Outlet Trip

successive hours during the period of greatest demand.

The new holder was built upon the only available piece of land at the Potrero, immediately adjoining the site of its predecessor, and in providing a suitable foundation for it almost unsurmountable difficulties had to be overcome. But the result was a finished foundation, a smooth, level, circular pancake of concrete, heavily reinforced with steel bars, and which nearly reached the extreme boundaries of the 200-foot city lot, on which the holder is located. Work on the steel bottom of the tank was begun on April 10th, 1911, and with excellent preparation, scores of mechanics, and the bountiful assistance of San Francisco's pleasant weather, the work was rushed to completion.

The early type of gas-holder consisted of a brick tank built underground, which contained the water for sealing the different sections of the holder; but modern practice pre-

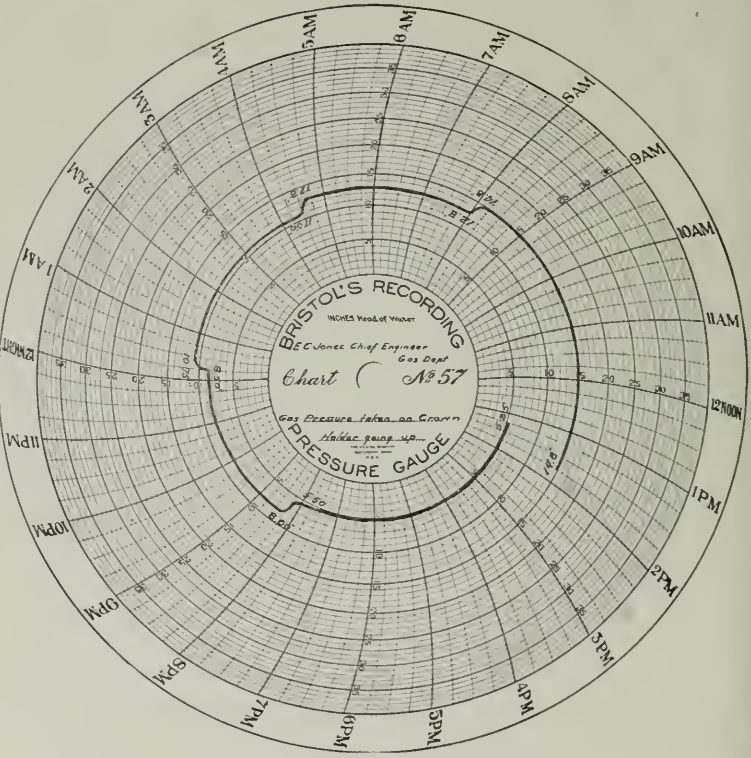


Chart 3. Gas-Pressure at Crown of Holder.

fers a steel tank constructed entirely above ground. This has many advantages over the old method, in shortening the time to build, in economy of construction, and the positive assurance of a perfectly water-tight tank when completed.

An idea of the size and strength of the tank at the Potrero may be gained from the following dimensions: diameter 195 feet, depth 38 feet 4 inches. The tank bottom, which rests on the concrete foundation, is made of steel plates $\frac{5}{16}$-inch in thickness. The side plating of the tank consists of eight courses of twenty steel plates each of varying thickness from 1 $\frac{7}{16}$-inch for the first to $\frac{7}{16}$-inch for the eighth course. When the tank was completed it required 8,283,915 gallons of water to fill it, and this water weighed 34,564.6 tons.

After the completion of the tank, the five telescopic sections of the holder were constructed within it, before it was filled with

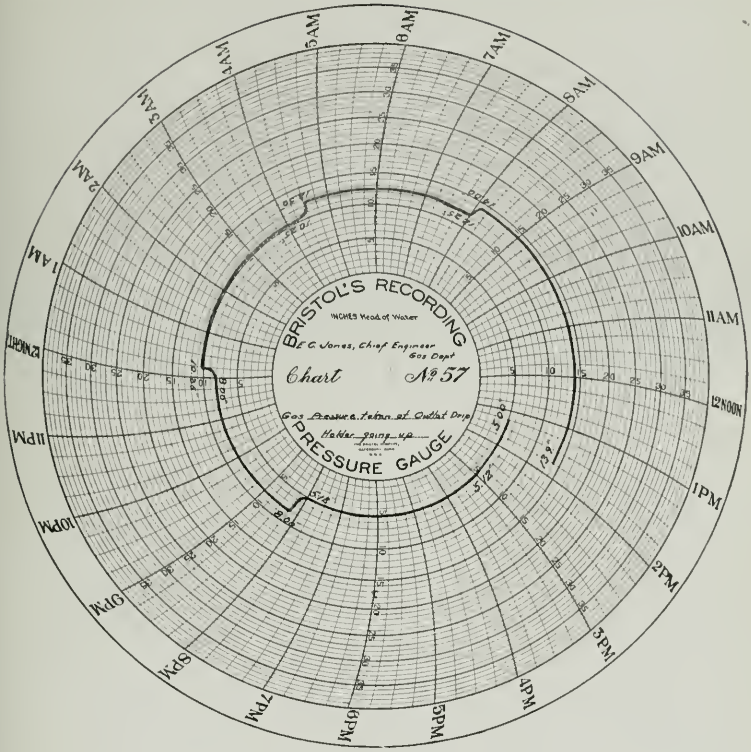


Chart 4. Gas-Pressure at Outlet Trip

water, and after the completion of these sections the first section of the guide-frame was built, after which the crown of the inner-section was finished. This inner-section of the holder, which is 182 feet in diameter and 37 feet 4 inches deep, carries a crown which rises 9 feet 10 inches in the center. The center plate of this crown is 69 inches in diameter, of $\frac{5}{16}$-inch steel, and the outer course of steel-plating of the crown consists of plates one-inch thick and fifty inches wide.

After the completion of the crown the tank was filled with water, on October 25th, 1911, and the inner lift of the holder was inflated with air. This lift was used as a scaffold for the construction of the second section of the guide-frame, and as each section of the latter was completed, the holder was still further inflated with air for use as a scaffold, until the guide-frame was entirely completed to the top. This guide-frame rises to a height of 188 feet above the top

Panoramic View taken from the top of

of the tank and is made up of twenty standards, 36 inches deep, tied together with six rings of horizontal struts 18 inches deep and 24 inches wide.

A reference to the illustration showing the completed 5,000,000-foot holder, and a portion of its 1,000,000-foot neighbor, will give an excellent idea of the relative size of the two holders. Previous to the building of the new one, the 1,000,000-foot holder was the biggest thing at the Potrero, and it was difficult to get men to scale the dizzy height to the top of the guide-frame, to apply the annual coat of paint. As the larger holder grew to heights far above, and dwarfed its little neighbor, a condition arose which might best be called psychological, as effecting the workmen on the new holder and the caretakers on the older one. The men employed in the erection of the guide-frame of the new holder became used to constantly increasing heights, and gradually lost their fear as the height increased, and the work became more dangerous, while those whose duty it had been to oil the bearings on the 1,000,000-foot holder looked upon their charge with something of derision and it actually became necessary to warn these men that the smaller holder had not become any less in height, nor less dangerous to climb, but that the proximity of the larger holder reduced its dimensions, in their mental estimation of the two.

After the new holder was completed it was filled with air to its entire height, five separate times, for the purpose of testing its tightness, and for carefully adjusting the bearings. It was then emptied of the air, and on January 26th, 1912, gas was first turned into it, and the holder was successfully placed in commission on that day. In the construction of this holder, and guide-frame, 5,270,000 pounds of steel was used, and this immense weight of material was so nicely distributed in the sections of the holder, guide-frame and ties, as to attain the maximum degree of strength and efficiency, to withstand the strain of wind and weather, and the possible effects of earthquake. The total height of the completed structure is 226 feet 4 inches.

Next it was decided to make careful experiments to determine the pressure exerted

older at the Potrero, San Francisco.

by the holder when filled with air, and also when filled with gas. To accomplish this, registering pressure-gauges were connected to the crown of the holder and to the outlet drip. A registering thermometer was also employed for temperature corrections. The holder was then filled with air, and the gradual increase in pressure is indicated by the charts numbered 1 and 2, No. 1 showing the pressure taken on the crown of the holder and No. 2 the pressure taken at the outlet drip. The perpendicular rise in pressure shows the increase due to the cupping of the different lifts. There is some difference in the pressure between the crown and the bottom of the holder, due to the difference in altitude of the two points.

Charts numbered 3 and 4 show the pressure of the holder while being filled with gas. No. 3 was taken on the crown and No. 4 at the outlet drip. In these charts there is a greater difference of pressure between the crown and the bottom of the holder, due to the buoyancy of the gas and the increment of pressure caused by the height of the holder. These charts are like the "handwriting on the wall" to the student of gas engineering, for from them may be calculated the weight of material in each lift of the holder, and they contain the answer to many interesting problems in gas-holder construction and operation.

In the old days, when gas in California was made from coal, more storage capacity was required, because the distillation of coal in retorts is slow and constant. And it was not considered safe to provide less than 60 per cent of the greatest daily output of gas, in holder capacity. In making gas from oil in large generators, it is made more quickly, and the apparatus possesses considerable elasticity in production, so that less storage is required.

Previous to the construction of the new holder the total storage capacity of San Francisco, including relief holders, was only 34 per cent. Wherever coal gas is made this would not be considered a safe amount, but the new oil gas process becomes a factor of safety. This holder brings the storage capacity up to 70 per cent, which is considered safe by the most conservative.

Authorized Additions and Improvements

SOUTH TOWER DIVISION.

Work has been commenced on the installation of three-phase equipment and replacement of single-phase regulator at Pittsburg Substation.

SANTA ROSA DISTRICT.

An ammonia type of washer is now being installed at the Gas Works.

COLUSA DISTRICT.

An ammonia type of washer is now being installed at the Gas Works.

STOCKTON POWER DIVISION

A new cooling system has been installed at the Stockton Substation.

FRESNO DISTRICT.

Work has been started on the installation of 3,000 feet of 6-inch cast iron main on J Street for the improvement of the service.

REDWOOD DISTRICT.

11,000-volt single-phase line is being extended along San Antonio Road toward Mountain View to take on additional consumers.

SACRAMENTO POWER DIVISION.

Meters are now being installed covering all flat rate consumers in the Town of Rocklin; and also in the Town of Newcastle.

ELECTRA POWER DIVISION.

Arrangements are being made for the placing of all flat rate consumers at Mokelumne Hill and San Andreas upon a meter basis.

MARYSVILLE DISTRICT.

Arrangements are being made for the placing of all flat rate consumers in Marysville upon a meter basis.

NAPA DISTRICT.

Work will shortly be commenced covering the reconstruction of the entire distribution system in Napa.

MARYSVILLE POWER DIVISION.

2,300-volt line has been extended from Smartsville Substation to furnish service to the Mark Anthony Mine.

SOUTH TOWER POWER DIVISION.

Work will shortly be commenced on the reconstruction of 60-kilovolt line between South Tower and Diamond.

NEVADA CITY DISTRICT.

Arrangements are being made for placing all flat rate consumers upon a meter basis.

GRASS VALLEY DISTRICT.

Arrangements are being made for placing all flat rate consumers upon a meter basis.

SANTA ROSA DISTRICT.

Arrangements are being made for placing all flat rate consumers upon a meter basis.

MARYSVILLE POWER DIVISION.

Extension of 11-kilovolt line has been made to the Town of Grimes for the purpose of furnishing service at that point.

SAN FRANCISCO DISTRICT.

Work will shortly be commenced on the remodeling of the gas plant of the Metropolitan Light and Power Company which was recently acquired by us with a view of bringing this plant up to the standard.

Much credit is due to Mr. Frank A. Fitzgerald, the able constructor for Messrs. R. D. Wood & Co., of Philadelphia, who carried to successful completion the work of building the magnificent 5,000,000-foot gas holder at the Potrero Gas Works, San Francisco. He is to be commended for his perseverance, skill and pleasing personality, and he has made many friends while in San Francisco.

PERSONALS

Mr. A. R. Thompson, the genial Superintendent of Electrical Distribution of the San Francisco District, holds a few records. His Department has recently hung up two new records, viz., a speed record for pulling underground cable and an economy record for the laying of underground ducts.

His latest achievement has been in the establishment of a record in the sporting line. This has been brought about by his acquisition of a duck shooting pond. He has been missed occasionally; to turn up a few days later with his usual genial smile, but no ducks (for his friends.)

A sleuth has recently given some inside information relative to these mysterious trips to the marshes of Alvarado; from which information we have been able to de-*duct* the following cost data:

Round-trip railroad fare to Alvarado and return	$2.00
Automobile hire to Oakland (missed last train)	4.00
Eatables	.50
Drinkables	2.00
Cost of two ducks (purchased)	.75
Total cost	$9.25
Total number of ducks laid low	2
Total nomber of duck(t) feet	4
Cost per duct foot	$2.31¼

In order that he may continue to uphold his *good* records, all friends sincerely hope that in his future sporting ventures he will apply the principles of Scientific Management.

Dan Cupid took a run over to Santa Rosa recently and as a result comes the announcement that Walter F. Price, Jr., son of former State Senator Price of Santa Rosa and an employee of the Pacific Gas and Electric Company, is engaged to wed Miss Geraldine D. Hodgson, daughter of Mr. and Mrs. D. R. Hodgson of the City of Roses.

From Fresno comes news of activity in the direction of club organization by employes of the local district office. There was a meeting held early in February which was called to order by Mr. W. M. Henderson, the District Manager, and at which H. S. Foster acted as Chairman and D. A. Wakefield, secretary.

Mr. Henderson announced that the meeting had been called for the purpose of organizing a club of an educational and social order. It was not, he said, to be a company nor a one man association, but a society for the benefit of one and all of its members. The proposition was greeted with great enthusiasm by all present. Committees on constitution and by-laws, program and meeting place were selected; also one to select an appropriate name for the club. Watch Fresno.

Manager W. E. Osborn of the Woodland District came to the front as a host a few days ago, the occasion being a banquet given at the Oaks Club in Woodland to H. K. Sturgis, a San Francisco official of the company. From all accounts it was a most enjoyable affair.

From Stockton comes the announcement that on February 13th, a little son arrived at the home of Mr. and Mrs. J. W. Brown. Mr. Brown is stenographer and accountant in the Stockton District Office of the Pacific Gas and Electric Company.

On Saturday, February 10th, there came a little stranger to the home of A. H. Caine, head of the Stationery Department of the Pacific Gas and Electric Company. The little one, a girl, has been christened Frances Bartlett. The Caine household now boasts one of either sex.

Pacific Gas and Electric Magazine

PUBLISHED IN THE INTEREST OF ALL THE EMPLOYEES OF THE PACIFIC GAS AND ELECTRIC COMPANY

JOHN A. BRITTON - - - - Editor-in-Chief
FREDERICK S. MYRTLE - - Managing Editor
A. F. HOCKENBEAMER - - Business Manager

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The Pacific Gas and Electric Company desires to serve its patrons in the best possible manner. Any consumer not satisfied with his service will confer a favor upon the management by taking the matter up with the district office.

Vol. III FEBRUARY, 1912 No. 9

EDITORIAL

Mr. Glenn Marston, one of the editors of "Public Service," went to England last December to conduct a special investigation into certain phases of municipal ownership. The result is to be found in a series of articles, the first of which appeared in the current number of the periodical referred to.

They should afford interesting reading. Mr. Marston's investigation shows that instead of being the great successes claimed for them the city-owned lighting plants of England as a rule are failures, both financially and in point of service. Despite gross legislative discriminations, private plants are gradually gaining a foothold, and in many places are displacing the municipal plants, because they are more efficiently managed and can furnish better service at a less cost to the consumer than can their municipal competitors. Writes Mr. Marston:

"Strange it is that the abandonment of municipal ownership has taken place at the very gates of the cities most strongly supporting it. The companies which were expected to die of starvation have done nothing of the kind. In fact, they grow more lusty every year. The most potent argument that could be found for the superiority of private management over municipal ownership is the fact that the British power companies have stepped in and found dividends where the municipalities feared to tread because they could see only deficits."

From the pleasant land of France comes the following word to the "Brooklyn Citizen" from its Paris correspondent:

"Government ownership in France is a fizzle. In some cases it is a fizzle, and a bad one, for both the government and the people. In others it reaps a financial harvest at the expense of the people. Nowhere does the public benefit."

Nearer home we gleam some information from the latest report of the Public Service Commission of the State of New York, Second Division. Under the heading, "Municipal Plants," the report reads:

"The Commission calls attention to the conduct of municipal lighting plants which are operated in two cities and forty-eight villages of the State. It is stated that such municipal plants are, with a few commendable exceptions, unable or unwilling to adopt practices of modern accounting, and in many instances the bookkeeping is limited to a record of consumers' accounts and a simple statement of receipts and disbursements with little or no attempt at analysis or classification. In some cases the affairs of the lighting plants are so inter-related to those of water or some other departments and the accounts of the two departments are so confused that it is impossible to determine the actual results of the operation of either department."

The Commission remarks, "that it is a matter of supreme importance, when municipalities embark upon business enterprises, that they should adopt business-like methods. The citizens of many a village are convinced that their lighting service is cheap, when as a matter of fact it is dear, because the lack of a proper accounting system fails to reveal the actual conditions. The Commission finds it is without sufficient force to teach the elementary rules of accounting to the administrative officers of these municipal lighting plants, but it is making a serious effort to accomplish complete and accurate accounting in municipal as well as in privately managed business enterprises, and to show that the extra work and the extra expense incurred will be more than compensated for by the greater knowledge of the business and the economies which can be effected thereby."

Among reports from elsewhere in the Union we note a heavy defeat for municipal ownership at La Salle, N. Y., where the proposition for lighting, water and sewage disposal plants was beaten three to one at a tax election; the failure of two municipal electric lighting plants in Michigan, one at Mendon, the other at Romeo; the violent opposition of the business men of Wichita, Kansas, to the municipal ownership of the lighting service of that city. Perhaps the most eloquent of all is the experience of Yorkville, South Carolina, told in an article published in the Charleston "News Courier," which says:

"About the first of October a material advance was made in the local electric light and water rates. Both plants are owned by the town and the consumers are not at all pleased with the increased cost, and many of them are of the opinion that if several of the heavier leaks were stopped that it would be possible not only to restore rates to the old basis, but even to lower them. Aside from the interest on the bonds issued to install the water and light plants, the consumers of water and lights are made to pay all the expenses connected with the operation and upkeep of both plants and also for the maintenance of the fire hydrants and the street lights. Several former consumers have side stepped the proposition, so far as lights are concerned, by installing gasoline lighting systems, and express themselves as being delighted with the change, both as to the quality of the lights and the cost, and it is quite likely that many others will adopt the same plan to secure relief."

In view of these details we think the public service corporation conducted along honest business lines may well hold up its head among the people in any community it serves and ask for fair consideration and an equitable return upon its investment.

In California, too, the State Legislature has offered a solution of the public service problem in a law providing for the regulation of public utilities by a State Commission, whose powers and duties include the fixing of rates and supervision of stock and bond issues in addition to other general features of corporation regulation. Any municipality that wants to may place its public utilities in the hands of this Commission. It's a question for the public to decide.

A Relic of Early Days

On the front cover of this number will be noticed the picture of an unpretentious little building, the memory of which is very dear to the hearts of all old gas men of this Company.

It is the office building of the first gas company formed in San Francisco, namely the "San Francisco Gas Company," founded August 31st, 1852, two years after the incorporation of San Francisco as a city.

The old gas works occupied the lit bounded by First, Fremont, Howard and Natoma Streets, and the office building was located at the southeast corner of First and Natoma Streets.

When this plant was built by Peter Donahue in 1855 the Bay (now half a mile away) extended to Fremont Street and coal and building material were landed from lighters directly at the Works.

The picture is from a photograph taken by Mr. W. R. Morgan September 15th, 1895.

Domestic Science Lessons

LESSON VII—CHAFING DISH RECIPES.

By MRS. H. ROSE STEWART.

The chafing dish has become an indispensable adjunct of modern home and social life and every housewife and bachelor feel the necessity of being able to use it well.

RABBITS IN RHYME

Should you ask me, friend or actor,
"Whence the flavor of the rabbit,
Whence its odor and its smoothness,
Whence its subtle fascination?"
I should answer. I should tell you:—
"From the method of its mixture,
From the choice of its ingredients,
And the time of introduction,
This the way to make a rabbit:—

Give me of your cheese, O grocer!
Good fresh dairy cheese domestic—
Cheese quite fresh, not old and mouldy."
Cut it then in dainty fragments—
Fragments cut in sizes equal;
Light the spirit lamp and place it
'N-ath the blazer, brightly gleaming;
Then a lump of butter placing
In the blazer, watch it creaming,
Creaming in the heated blazer;
Then with deftness add the substance—
Creamy substance, cut in fragments.
Then when it doth melt and thicken,
Pour on ale—the ale called Bass:
Gently add in scanty spoonfuls,
Lest you chill the substance melting—
Always stirring, stirring always.

When the cheese to heat surrenders
Drop into this dish so tempting
Two teaspoonfuls, measured finely,
Only two of Colman's mustard.
This you add to keep dyspepsia,
Grim dyspepsia, from partakers—
All this while keep up the stirring,
Always stirring, stirring always.
Add a touch of red paprika,
Made from pepper tips Hungarian:
This the foe of indigestion,
Deadly foe of indigestion.
Now you stir with vim and ardor,
For the rabbit nears completion,
And the appetites are whetted
By the subtle, faint aroma.
Plates, hot plates, must be beside you;
Crowned with butered toast, and waiting
For the baptism of the rabbit.
Hot and smooth, and oh, so fragrant!
Quickly bid the guests assail it,
Ere a breath of air can chill it;
Ale or beer attend the feasting,
And delay is most disastrous;
Plates and toast and beer and glasses
Must be ready at your elbow—
Quickly served and quickly eaten,
And the grace be spoken after,
This the secret of the rabbit.

SAVORY CRAB WITH TOMATO SAUCE

Cut up a boiled crab, separate all the meat from the shell and claws. Put the meat into a saucepan with three heaping tablespoonfuls of fine bread crumbs, four tablespoonfuls of tomato sauce, the strained juice of half a lemon, and a little finely chopped lemon rind. season with salt and pepper, and a dust of red pepper, add a wineglassful of sherry wine. Let all simmer over the fire, whilst stirring, for ten minutes; then add one tablespoonful of sweet butter, bring to boil once more, then turn out on a deep dish; garnish the dish with fried bread croutons and rings of lemon and serve.

CHEESE A LA REX—A DAINTY LUNCHEON DISH

One-quarter teaspoonful Extract of Beef dissolved in hot water; one tablespoonful butter; one teacup grated cheese melted in butter; one and one-half cups bread crumbs soaked in cup milk; one egg slightly beaten; salt and paprika. Mix ingredients, stirring as little as possible; use chafing dish or double boiler; let cook ten minutes.

CREAMED CHICKEN WITH MUSHROOMS

Cut breast of cold chicken in small dice and season with salt and pepper. Now take two tablespoonfuls of good butter, one of flour and moisten with one cup of hot cream in which half a teaspoonful of Extract of Beef has been dissolved, and beat over fire until smooth. To this add chicken with one quart of fresh mushrooms cut in dice; let all simmer twenty minutes. Serve on strips of toast; garnish with green parsley.

SOFT CLAMS A LA NEWBURG

Procure forty-two very fresh, soft clams, so that no sand should adhere to them after they are opened; lay them carefully in the palm of the left hand, and with the fingers of the right remove the body gently, but nothing else, being very careful not to break it, and throw away all that remains. When they are all prepared, place them in a stewpan with an ounce of good butter, half a pinch of white pepper, a wine-glassful of good Madeira wine, and two finely hashed, medium-sized truffles. Put on the cover, and let cook gently for eight minutes. Break three eggs yolks into a bowl, add a pint of sweet cream; beat well for three minutes, then pour it over the clams; turn well the handle of the saucepan for two or three minutes, very gently shuffling the clams, but it must not boil again or the clams will break, and be very careful not to use either a spoon or fork. Pour them into a hot tureen, and send to the table at once.

CURRIED LOBSTER

2 small lobsters
4 tablespoonfuls veal gravy
4 tablespoonfuls of cream
2 tablespoonfuls curry powder
1 teaspoonful of flour
1 tablespoonful of butter
Juice of one-half lemon
½ blade of mace

Pick the lobsters from their shells. Put them into a stewpan with the mace, gravy and cream, the curry powder, flour and butter. Let all simmer for one hour. Add a pinch of salt. Squeeze in the juice of the lemon and serve.

HOMARD A L'AMERICAINE

1 large lobster
1 pint Rhine wine
½ glass brandy

Boil the lobster for thirteen minutes in a mirepoix sauce. Add just before taking off the wine and brandy. After taking out the lobster pick out the meat in as large pieces as possible.

THE MIREPOIX, *a basis for brown sauces, is prepared as follows:*

3 ozs. butter
1 lb. raw ham
½ lb. fat bacon
2 onions
2 shallots
2 small carrots
A bunch of parsley
2 bay leaves
2 sprigs of thyme
12 bruised pepper-corns

Cut the meat and butter into small pieces. Slice the onions, carrots and shallots and bruise the peppercorns. Mix all together and brown in a saucepan. When the mixture is slightly colored pour into it two quarts of good veal stock and a pint of any light wine. Boil slowly for two hours.

When the Mirepoix is boiled to the consistency of thick soup set the lobster shell upright in the dish. Arrange the meat around it and pour over the meat the Mirepoix. If the Mirepoix is not sufficiently thick it can be thickened with butter and flour.

Over the Mirepoix can also be spread lobster butter if desired.

CHEESE WITH PEPPERS

Melt two heaping teaspoonfuls of butter in the chafing dish, add five tablespoonfuls of chopped green or red pepper, one chopped onion, one-quarter cup grated cheese, one-quarter cupful of cream or milk, seasoning of salt, pepper and paprika, and four well beaten eggs. Cook till thoroughly mixed and serve hot on buttered slices of toasted bread.

STEWED MUSHROOMS IN CREAM

Wash one-half pound of mushrooms. Remove stems and cut in small pieces. Melt three tablespoonfuls of butter, add mushrooms and cook three minutes. Sprinkle with salt and pepper and add one cupful of thin cream, and thicken slightly with one tablespoonful of flour first mixed.

LOBSTER A LA NEWBURGH

1 large lobster
1 pint sweet cream
1 tablespoonful butter
2 tablespoonfuls flour
1 wine-glass sherry

First boil the lobster for twenty minutes. Then pick it out in small pieces. Pour over it the cream and add the butter and flour which have been rolled together. Warm in a chafing dish and stir gently while warming. Just before serving pour in a wineglassful of sherry.

LOBSTER A LA DELMONICO

Melt ¼ cupful of butter
¾ tablespoonfuls of flour
½ teaspoonful of salt
A few grains of cayenne, and
1 cupful of thin cream

Stir until thoroughly mixed and add two pounds of lobster, and when heated, add the yolks of two eggs well beaten, and two tablespoonfuls of sherry wine. This sauce recipe may be used, substituting clams or shrimps in place of lobsters.

CURRY

½ lb. cold meat
2 ozs. butter
1 onion
1 apple
½ oz. flour
1 dessertspoon curry powder
½ pint stock
Salt and pepper

Brown the sliced onion in the butter, add to the pan the curry powder, when these are well mixed, add the stock and stir until boiling, grate the apple and add it also. Allow it then to boil slowly ten minutes. Place in it then the slices of cold meat until very hot. Serve with rice.

BREADED TONGUE WITH TOMATO SAUCE

Cut cold boiled tongue in slices one-third of an inch thick. Sprinkle with salt and pepper, dip in egg and cracker crumbs and fry in butter. Serve with the following sauce: One-half can of tomatoes cooked fifteen minutes with one small onion; press through a sieve and add three tablespoonfuls of butter and three tablespoonfuls of flour browned, and one-half teaspoonful of salt, and a dash of pepper.

WELCH RAREBIT

Heat to a boiling point a piece of butter the size of an egg with one-half cupful of lager beer or ale. Then add one-half teaspoonful of mustard, first mixed, one-quarter of a teaspoonful of paprika and three-quarters of a pound of grated cream cheese. Stir all thoroughly, then add yolks of two eggs. Serve on rounds of toasted bread.

OYSTER STEW

Heat one cup of milk, and two cups of water until it is boiling, add butter the size of an egg, pepper and salt, now turn in one pint of fresh oysters and allow it to boil up once, it is then ready to serve.

CREAMED OYSTERS

25 oysters
½ pint cream
1 oz. butter
A little mace, salt and pepper
2 tablespoonfuls of cracker crumbs

Scald the oysters in their liquor, put cream into a saucepan, add seasoning and cracker crumbs. When boiling pour it over the oysters, serve in small soup plates with a small slice of buttered toast.

Cooking by Electricity

[From Vice Consul General Carl R. Loop, supplementary to notes on the London Electrical Exhibition in Daily U. S. Consular and Trade Reports for Nov. 22, 1911.]

Demonstrations were given at the London Electrical Exhibition in electric cooking several times daily by representative firms. In view of the fact that electricity for this purpose and for heating can now be obtained at a cost varying from 2 cents to 3½ cents per unit (instead of the lighting rate of 8 cents to 12 cents), the increased interest taken in and the greater activity among makers in advertising the advantages of this method of cooking can be more readily understood. In the case of one system, which consisted of a series of hot plates on flexible armored wire, it was claimed that there was a saving of $90 on a yearly expenditure of $415 under the old style; this included butcher's, coal, and electricity bills. In addition to the economy in coal, there was a remarkable saving effected in the shrinkage of meats, as evidenced by the following table:

MEATS	WEIGHT		WEIGHT WHEN COOKED		TYPE OF OVEN	LOSS	
	LB.	OZ.	LB.	OZ.		LB.	OZ.
Leg of mutton	8	8	5	13	Coal	2	11
Leg of mutton	8	4	6	0	Gas	2	4
Leg of mutton	9	0	7	12	Electricity	1	4
Shoulder mutton	6	13	5	1	Coal	1	12
Shoulder mutton	5	10	5	0	Electricity		10
Topside of beef	5	4	3	6	Coal	1	10
Topside of beef	4	0	3	8	Electricity		8

The Car Accident Question

At a recent convention of street-car men in Seattle, B. F. Boynton of the Portland Railway, Light and Power Company, made these pertinent suggestions concerning street car accidents:

"In the front-end accidents there are two questions which if they are answered settle the case, and those are: 'How far was the individual or vehicle when it appeared on the track?' and the next is, 'How far did your car go after you struck it?' With those two questions answered you can tell everything in regard to your responsibility for a front-end accident. Now these two questions have saved us a good deal in the last year. That is a problem that is solved in this way:

"Our latest cars weigh twelve tons to forty-five tons. If it is a buggy that weighs just a few pounds, if your car strikes this buggy or wagon or whatever it is that weighs not more than half what yours does, the minute you hit it, if it is on a smooth pavement, you are going to knock it off to one side and you will find the mark on the rail where you threw it off—you will find it every time if you hunt it up—let the motorman walk back until he finds that mark; then he steps the distance from that mark and we will say it is five steps from that mark to the front end of his car. How far has the car gone? He steps, approximately, three feet to the step; his car has gone approximately fifteen feet—the papers will come out and say you have gone two hundred feet.

"Some man sees him stepping the distance and says, 'What are you trying to do?' 'I am trying to find out how far our car went after striking the wagon.' 'How can you tell?' Take him back and show him. I have seen as many as five or six men stepping the distance where a man has been killed, because they saw our motorman doing it, and that one thing has won suit after suit for us, the mere fact of the man stepping off that distance. If it is a cross walk the minute the car stops, have him step the distance back to the cross walk, and that has won for us case after case."

What the Press Has to Say

Bonds Sold Like Hot Cakes

No Trouble in Finding a Market for the Pacific Gas and Electric Company's New $20,000,000 Bond Issue

Evidence of the confidence in which California securities are held by investors not alone of this country, but also of Europe, was afforded yesterday when the entire lot of the Pacific Gas and Electric Company's $20,000,000 general and refunding mortgage 5 per cent gold bonds was purchased within eight hours after being placed upon the market. Late Thursday night the bonds, which were purchased by Morgan in December, were repurchased by N. W. Halsey & Co. and the Harris Trust and Savings Company. Yesterday morning they were placed upon the market and at 5 o'clock last night Alfred T. Brock, San Franciscno representative of Halsey's received a wire informing him that all of the bonds had been disposed of, investors of California, New York, London and Berlin purchasing them as quickly as they were placed upon the market. The sales were widely distributed.

This $20,000,000 bond issue is the first installment of the $150,000,000 issue authorized by the board of directors of the gas company recently when announcement was also made that the capital stock of the company was to be increased to $150,000,000 that the financial requirements of the company for many years to come might be provided for. The present installment will retire other outstanding bonds of the company and leave a balance of approximately $6,000,000 which the company will expend in making such improvements as are necessitated from time to time in the next year or so.

It was the quickness with which the bonds were taken over by the investing public, however, that proved the surprise of the day among bond brokers Little difficulty in disposing of them was anticipated, but a fortnight's time, it was expected, would be consumed in disposing of them. In anticipation of the successful termination of negotiations for the repurchase of the bonds from Morgan, the Halseys and the Harris Company had sent out advance notice of the probable marketing of the bonds within a short time.

The eagerness of investors to obtain possession of California securities was demonstrated within an hour after the opening of the market.

San Francisco (Cal.) *Chronicle*, Jan. 27, 1912.

Fresh Power for Capital City

Pacific Gas and Electric Company Spending Upwards of Half a Million on New Steam Station near Sacramento

More than a half million of dollars are to be spent by the Pacific Gas and Electric Company on a great electrical station now building north of the city, because the growth of Sacramento has been so rapid during the past few years that the ordinary sources and means of supplying electrical energy to the capital city has become inadequate.

Frequent "interruptions" occur during the winter days, in the lighting system of the city, due to trouble on the lines that flow into Sacramento from de Sabla, Colgate, Folsom and other points of generation for the corporation supplying most of the "juice" for the city. When the new station is in working trim, the interruptions will be reduced to a minimum of occurrence. When a line goes out the power from the great steam station will be turned on and the mighty dynamos that are to be installed there will grind out juice for the citizen who is buying it from the Pacific corporation. The new plant now building, as shown in the half tone on this page, has reached the foundation stage, all concrete work for the base having been completed. The building will be modern and fireproof, of beautiful design by a world-famous architect, Willis Polk. It will be 80 x 130 feet in dimensions and immediately after completion some of the most modern machinery in the world will be installed. The dynamos will be the latest design, the boilers will be fed by oil instead of coal, and the engines will be of turbine type. All machinery and electric fittings will be installed by the company's engineer. The company has spent about $60,000 during the past year in bettering its electrical service but nothing has been done to extend it. Immediately after the completion of the new plant, which is being erected about 300 yards north of the old channel of the American river, and about a half mile north of the city, the Sixth and H Street plant will be abandoned by the high tension substation. The new plant will have a capacity of 13,500 kilowatts in power.

Sacramento (Cal) *Union*, Jan. 21, 1912.

Beauty in a Business Building

Station "D" as Reconstructed Regarded as Furnishing an Object Lesson in San Francisco

Alterations and additions lately made by the Pacific Gas and Electric Company at Station D in Bush Street, between Polk and Larkin have given a touch of classic beauty to a purely commercial building.

It is only within the last few years that the problem has arisen and been seriously considered of giving architectural grace to that class of structures.

Their private and mercantile character necessitates economy of construction, yet even under these conditions the new electrical station has been admirably handled in the present instance.

The requirements were a building of moderate height and inexpensive construction for transformers adjoined by a second building for storage batteries. In meeting the first of these requirements the old building was remodeled into the pleasing front it now presents.

The second building was sunk till it was a few feet above the street level. The roof was treated as a formal garden with fountain, pools and gravel walks, benches and bay trees. The warm water from the transformers is passed through the fountains and into the glass bottom pools, where it cools and is returned to the transformers for re-use. Light is admitted into the storage room through the glass bottoms of the pools.

This is a good illustration of how warehouses, substations or factories can be made objects of beauty instead of the far too frequent eyesores. Financially, the difference in cost is but slight, while the plan, if followed out generally, will add greatly to the attractiveness of the city.

San Francisco (Cal.) *Call*, Feb. 10, 1912.

Improving the City of Napa

Pacific Gas and Electric Company Reconstructs Distributing System in Business Section and Will Expend $20,000 in Residence District

The Pacific Gas and Electric Company is on the point of completing the great task of reconstructing its lines in the business section of Napa.

Last October the plan of removing the overhead distribution system from Main and Brown Streets was approved by the Company, and the sum of $10,000 was appropriated with which to meet the cost of the undertaking. Material was immediately ordered, and upon its arrival early in November two crews of men were put to work.

Today the result is notable. Starting from the substation and continuing out First Street to Seminary Street, with branches on Coombs, Pearl and Second Streets, a new pole line of standard construction has been built. All the poles and cross-arms are painted a uniform color and the effect is most pleasing to the eye.

On Main and Brown Streets the removal

of the unsightly overhead wires has greatly added to the beauty of the city. The consumers on those streets are now supplied with power through iron conduits running along the front of the buildings. The conduits are installed according to the specifications of the Board of Fire Underwriters and will successfully operate under any emergency which might arise.

The benefits of the new system will not be in appearance alone, as separate circuits have been provided for the residence and business sections of the town, thereby improving voltage conditions.

In the near future an additional amount of $20,000 will be expended by the Company in re-building their lines in the residence section of Napa in order to improve the service.

Napa (Cal.) *Register*, Feb. 3, 1912.

New Light for Yuba City

This week the Pacific Gas and Electric Company is planning to penetrate the rich section of country south and west of Yuba City as far as Tudor and O'Banion and Harkey Corners, according to reports from residents in those vicinities. Poles for the feeders that will embrace a scope of country ten miles square have been ordered and in a few weeks a force of linemen will be at work running wires for the juice that will supply power and light to the country embraced in the lines covering Harkey Corners, O'Banion Corners, Tudor and the territory south of Oswald Station.

Such an improvement will be received by the people with much joy. The old oil lamps will be consigned to the junk piles and the gasoline tanks that have supplied motor power will be emptied of their contents and dumped with the rest of the obsolete material.

The company now has power lines penetrating the section of Oswald and the Walton neighborhood and those people are enjoying both light and power by electricity.

Yuba City (Cal.) *Independent*, Jan. 18, 1912.

Banquet to H. K. Sturgis

H. K. Sturgis, who is connected with the "new business" department of the Pacific Gas and Electric Company, was at a banquet given by W. E. Osborn, local manager of the company. The local employes of the company were also Mr. Osborn's guests.

The affair was held in the banquet room of the Oaks Club. The menu included all the delicacies of the season and was nicely served.

While the cigars were being enjoyed each guest was called upon for remarks, and the responses were all directed with a view of bettering the service.

Those present were: H. K. Sturgis, W. E. Osborn, George Underhill, Eliot Roberts, L. Armfield, A. Babb, A. Silberstein, Earl Snavely, James Douglas, Bert Swayze and B. Bratton.

Woodland (Cal.) *Independent*, Jan. 26, 1912.

Rates to be Reduced

The Pacific Gas and Electric Co. has announced a reduction in its lighting rates from 9c to 7c a kilowatt hour to become effective on January 1, 1912, thus giving the people of Hayward and the surrounding territory the same rate that prevails in Oakland and Berkeley.

This reduction will certainly be appreciated by its many patrons. It is the aim of the Pacific Gas and Electric Co. to give its patrons the best service possible and with that aim in view now has in working order eleven plants generating electricity by water power and five steam generating plants. All connected by a net work of lines which makes it possible for each plant to carry the entire load in case of emergency, thus assuring the public a perfect service, making it the most modern and up-to-date electric system in the world.

Hayward (Cal.) *Journal*, Jan. 26, 1912.

New System for Martinez

On Friday if the present plans of Manager Don C. Ray of the Pacific Gas and Electric Company are carried out the work of cutting over onto the new street lighting system in Martinez will begin and it is expected that the task will be completed on that day so that on Friday evening the new lighting system will be in operation in the streets of this city.

Under the new tungsten system the streets will be far better lighted than heretofore the larger and more powerful 40 watt tungsten globes with more powerful reflectors replacing the present inadequate incandescent lights of 32 c. p. and the 250 watt tungstens taking the place on the down town streets of the few arc lights now in position. Along Main Street from Smith Street to Pine Street lights will be suspended over the center of the street crossings in very block and will give a powerful light aided by the high power tungstens.

The original survey for the new system called for 66 lights of which about a dozen will be of the 250 watt power the remainder being of the smaller power. The work on the new street lighting system in this city has been carried on with great dispatch by the linemen of the company under the direction of Manager Ray who is anxious that the new system be in operation at once and that local people may see the difference between the new and old systems.

Martinez (Cal.) *Gazette*, Jan. 25, 1912.

Antioch Joins the Band

New Electric Installation Puts Thriving City in the Front Rank

With the completion this week of the work of installing additional equipment in the local electric light substation, Antioch now has one of the most complete supply stations between Stockton and Berkeley. Superintendent of Construction Work, Fred Maynard, and his force of men have been working at various times since last May placing the various equipment in position, all of which is the very latest.

The most important matter is that the station is so arranged that it is almost impossible for the users to be without current for any great length of time. With a view to providing against possible accidents, there are switches that can be thrown in almost instantly, which would furnish power from the east in case the wires were out of commission on the west, or vice-versa, while power could also be turned to the town lines from the paper mill or Diamond station.

To make the station more complete, a large automatic regulator adjusts the current whether it is either low or high and does the work even better than were a man stationed there for this same purpose.

Water is used to cool the transformers and the pump is so arranged that it acts automatically, so that when the supply is low the motor begins pumping, being cut off when the supply is adequate for the present needs. Also in case of accident, and the water at the station can not be used, a valve operates, which admits water from the town to flow into the tank.

To further guard against accident, the switches are so arranged that should the current be cut for any reason, a bell rings in the station and also in the residence of J. D. Bcsoain, who is known as the "twenty-four hour man," and he at once corrects the trouble.

The entire station is compact, convenient and most interesting, and the work performed by Mr. Maynard and his assistants, demonstrates that they are experts in their line of work.

Antioch (Cal.) *Ledger*, Jan. 13, 1912.

Every sincere utterance of the soul, every testimony faithfully borne to a personal conviction, is of use to someone.

Amiel.

PACIFIC GAS AND ELECTRIC COMPANY

DIRECTORS

F. B. Anderson
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John A. Britton
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John S. Drum
D. H. Foote
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Cyrus Peirce
Louis Sloss
Joseph S. Tobin
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W. R. Eckart......Consulting Engineer
F. G. Baum......Consulting Engineer

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H. Bostwick......Secretary to President
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P. M. Downing......Engr. O. & M. Hyd.-Elec. Sect
C. J. Wilson......Asst. Engr. Electric Distribution
F. H. Varney......Engr. O. & M. Steam & Gas Eng. Sect

DISTRICT MANAGERS

District	Headquarters	Manager
Alameda Co.	Oakland	F. A. Leach, Jr.
Antioch	Antioch	F. J. Southerland
Berkeley	Berkeley	F. A. Leach, Jr.
Chico	Chico	H. B. Heryford
Colusa	Colusa	L. H. Hartsock
Contra Costa	Martinez	Don C. Ray
Fresno	Fresno	W. M. Henderson
Grass Valley	Grass Valley	John Werry
Marysville	Marysville	J. E. Poingdestre
Marin	San Rafael	W. H. Foster
Napa	Napa	O. E. Clark
Nevada City	Nevada City	John Werry
Oakland	Oakland	F. A. Leach, Jr.
Petaluma	Petaluma	H. Weber
Placer	East Auburn	H. M. Cooper
Redwood	Redwood City	E. W. Florence
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San Francisco	San Francisco	G. C. Holberton
San Jose	San Jose	J. D. Kuster
Santa Rosa	Santa Rosa	M. G. Hall
Solano	Dixon	C. E. Sedgwick
Stanislaus	Newman	W. A. Widenmann
Vallejo	Vallejo	A. J. Stephens
Woodland	Woodland	W. E. Osborn

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Nevada (Nevada City)......George Scarfe
Placer (East Auburn)......H. M. Cooper
Standard (Electra)......W. E. Eskew
Stockton (Stockton)......J. W. Hall

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De Sabla......I. B. Adams
Electra......W. E. Eskew
Marysville......C. E. Young
Nevada......George Scarfe
North Tower......C. D. Clark
Oakland......William Hughes
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San Jose......J. O. Hansen
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Stockton......E. C. Monahan
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C. A. Eastwood, Chief Engr. Station "A," San Francisco
T. E. Fogalsang, Supt. Generating Statn., San Francisco
J. W. Varney ..... Supt. of Sub-stations, San Francisco

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Oakland and Alameda (Overhead)......A. U. Brandt
Sacramento......C. R. Gill
San Francisco......A. R. Thompson
San Jose......A. C. Ramstad

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Sacramento......Edward S. Jones
San Francisco......Dennis J. Lucey
San Jose......R. H. Hargreaves

SUPERINTENDENTS OF GAS DISTRIBUTION

Oakland......George Kirk
San Francisco......W. R. Morgan

PACIFIC GAS AND ELECTRIC COMPANY

CITIES AND TOWNS SUPPLIED WITH GAS, ELECTRICITY, WATER AND RAILWAY

Service Furnished	Number of Towns	Total Population
Electricity	187	1,081,222
Gas	49	978,167
Water	10	45,825
Railway	1	60,000

Place	Population
Alta	20
[1] Alameda	25,000
[2] Albany	800
Amador City	200
Adams John	25
Alleghany	200
Alto	25
Angel Island	280
[5] Auburn	2,375
Agua Caliente	100
Algarado	900
Antioch	3,000
[2] Barber	500
[2] Belmont	350
Ben Lomond	800
Belvedere	1,000
Benicia	3,360
[2] Beresford	25
[2] Berkeley	40,000
Biggs	750
Big Oak Flat	20
Brentwood	200
Broderick	200
Brown's Valley	50
Byron	200
[2] Burlingame	4,000
California City	25
Camp Meeker	200
Campbell	600
Centerville	1,000
Centerville	20
[2] Chico	13,000
[3] Colma	3,500
[2] Colusa	1,500
Concord	1,500
Cement	1,500
[5] Colfax	500
Cordelia	150
Corde Madero	350
Crockett	2,500
Crow's Landing	375
Cupertino	50
Daly City	250
Danville	250
Davis	750
Decoto	350
de Sabla	25
[5] Dixon	1,000
Dobbins	50
Davenport	1,000
Drytown	20
Durham	500
Dutch Flat	500
Duncan's Mills	150
[2] Easton	300
[3] East San Jose	1,660
Eagle's Nest	50
Edenvale	500
Eldridge	500
Elmira	150
El Verano	400
[2] Emeryville	5,000
Encinal	100
Fairfax	500
Fairfield	834
Forestville	100
Felton	300
[1] Fresno	30,000
[2] Fair Oaks	250
Folsom	1,800
Gilroy	2,000
Glen Ellen	500
Gold Run	100
[3] Grass Valley	4,500
Gridley	1,800
Groveland	125
Guerneville	500
Hammonton	500
[2] Hayward	4,000
[2] Hillsborough	1,000
Hollister	3,000
Hookston	75
Ignacio	100
Ione	900
Irvington	1,000
Jackson Gate	100
Jackson	2,035
Kennedy Flat	20
[2] Kentfield	250
Knight's Landing	850
Lake Francis	5
Lathrop	300
Live Oak	200
Livermore	2,250
Los Gatos	3,000
Larkspur	600
Lincoln	1,400
[2] Lomita Park	100
Los Altos	500
[5] Loomis	400
Martinez	5,000
Martell	150
[2] Marysville	7,000
Mayfield	1,500
[2] Menlo Park	1,500
Meridian	300
[2] Millbrae	300
Milpitas	300
Mill Valley	2,500
Mission San Jose	500
Mokelumne Hill	150
Monte Rio	50
Moulton's Landing	30
Mountain View	2,500
Mare Island	500
[2] Napa	7,000
[2] Nevada City	2,700
New Chicago	10
Newark	700
[5] Newcastle	750
Newman	1,000
Niles	800
Nicolaus	75
Novato	250
[2] Oakland	230,000
Oakley	80
[2] Palo Alto	6,300
Pacheco	200
Penryn	250
Patterson	300
Penn Grove	300
[2] Petaluma	5,500
[2] Piedmont	1,720
Pike City	200
Pinole	1,500
Pittsburg	2,372
Pleasanton	2,000
Point San Pedro	20
Port Costa	600
[2] Redwood City	8,200
[2] Richmond	10,000
Rio Vista	884
[5] Rocklin	1,000
[5] Roseville	2,600
Rodeo	500
[2] Ross	500
[4] Sacramento	60,000
San Andreas	200
[2] San Anselmo	1,500
[2] San Bruno	1,500
[2] San Carlos	100
[2] San Francisco	416,912
[2] San Jose	30,000
[2] San Leandro	4,000
San Lorenzo	100
[2] San Mateo	6,500
[2] San Quentin	2,500
[2] San Rafael	6,000
San Pablo	1,000
Santa Clara	6,000
Santa Cruz	16,000
Saratoga	50
[2] Santa Rosa	12,000
[2] Sebastopol	1,200
Sausalito	2,500
Smartsville	500
[2] South San Francisco	2,500
[2] Stanford University	2,600
Sonoma	1,200
Stege	1,000
[5] Stockton	30,000
Suisun	1,200
Sutter City	150
Sutter Creek	1,500
Sunnyvale	1,500
Tiburon	400
Tormey	20
Towle	100
Tracy	1,200
Vacaville	1,200
[2] Vallejo	15,000
Walnut Crek	350
Warm Springs	200
Watsonville	4,500
Wheatland	1,400
Winters	1,200
[2] Woodland	3,200
Yolo	400
[2] Yuba City	1,200
Total	1,136,222

Unmarked—Electricity only.
1—Gas only.
2—Gas and Electricity.
3—Gas, Electricity and Water.
4—Gas, Electricity and Street Railways.
5—Electricity and Water.

EMPLOYS 4,500 people.
OPERATES 11 hydro-electric plants in the mountains.
4 steam-driven electric plants in big cities.
17 gas works.

SERVES ⅔ of California's population.
30 of California's 56 counties.
An area of 37,950 square miles.
⅗ the size of New York State.
½ the size of all the New England States combined.

Special Announcement

OPENING OF OUR WESTERN OFFICE

¶ For a number of years the ***Humphrey Arc Lamp*** and line of ***Humphrey Mantles*** have been distributed through our Pacific Coast Representative, The W. F. Boardman Co. of San Francisco.

¶ Beginning with ***March First*** we beg to advise that we will be pleased to serve the ***Gas Industry*** on the ***Pacific Coast*** through ***our own Office,*** which will be located at ***237 Powell Street, San Francisco.***

C. B. BABCOCK
PACIFIC COAST REPRESENTATIVE

General Gas Light Co.

SAN FRANCISCO
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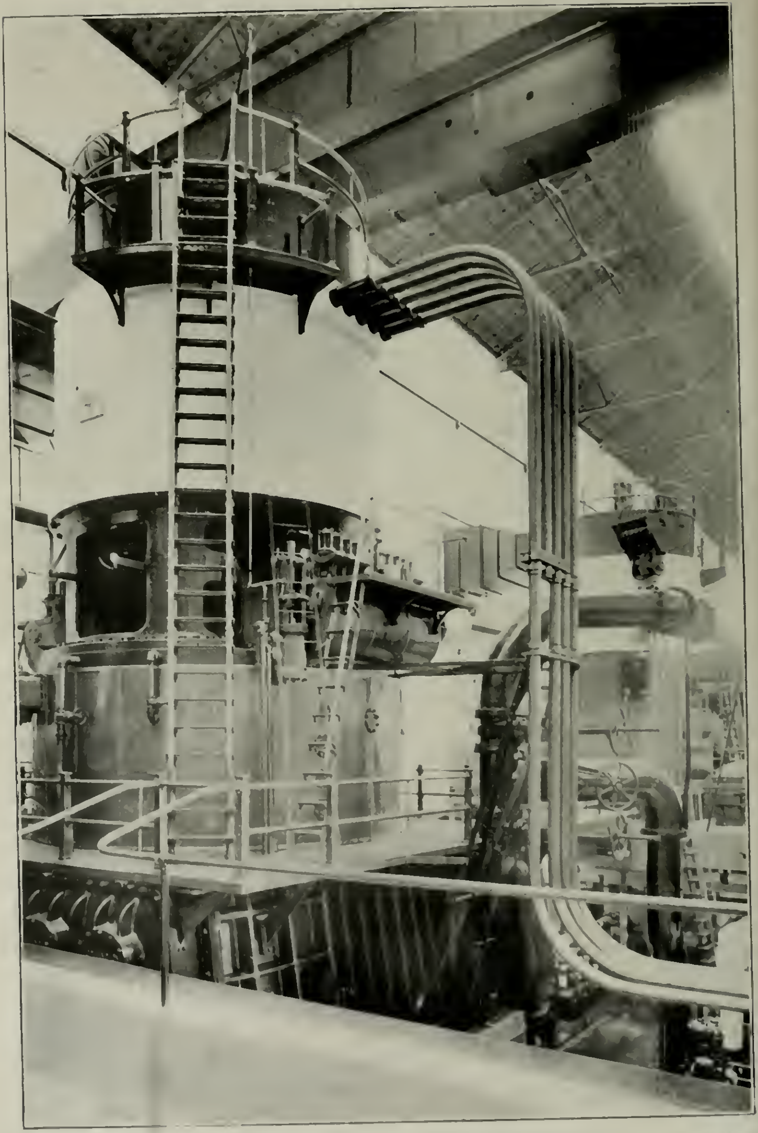


The 15,000-Kilowatt Steam Turbine recently installed at Station "A," San Francisco. It is the largest in service west of Chicago. In the background is seen its companion, of 12,000-kilowatt capacity.

PACIFIC GAS AND ELECTRIC MAGAZINE

VOL. III MARCH, 1912 No. 10

The 15,000 Kilowatt Steam-Turbine at Station "A", San Francisco

By FRANK H. VARNEY, Engineer O. & M. Department, Steam Section.

F H Varney

Considering the extreme simplicity of its design, the steam-turbine appears to have made somewhat gradual advancement in the field of commercial activities.

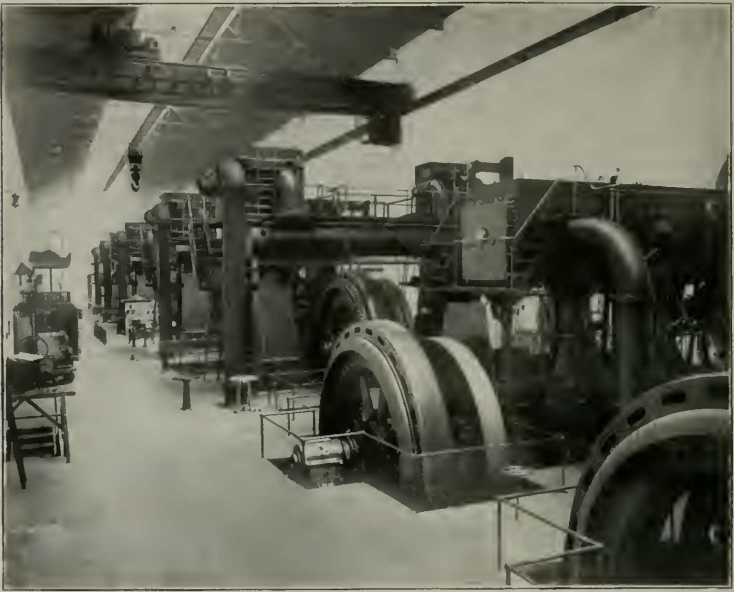
The idea is suggested that engineers look for complexity in machinery design and delight in constructing apparatus that takes a deal of labor and hard thinking to perfect.

Such is not the fact, of course. Simplicity is the ruling feature in all engineering work, and without it no machinery will enjoy a very long life. Consequently, we marvel all the more why it is that the turbine has been so long in obtaining general recognition.

Only a few years ago a steam electric station was built in San Francisco containing five units, each of 1,500 kilowatt capacity, and provision was made, should conditions ever warrant such a step, to double the length of the building to accommodate five more units of similar capacity. Well, conditions did warrant it, and not only was the building extended to cover the entire lot before the first installment was completed but, on account of the rapid increase in the use of electricity, units 9 and 10 were increased to 3,500 kilowatt capacity.

This year, one of the 1,500 kilowatt engines was removed to make a place for a 15,000 kilowatt turbine, and this latter unit, with ten times the capacity of its predecessor, takes up less room. As will be seen by the picture, the turbine occupies less floor-space, and needs no more head-room. It is the second turbine installed in Station "A". The other, which was installed a year ago, has a capacity of 12,000 kilowatts, both ratings being at 80 per cent power factor. They are both modern machines, the 15,000 kilowatt unit being the largest in service west of Chicago. It is of the vertical, six-stage type, and represent the most modern device constructed by the General Electric Company.

It is known as the impulse type of turbine, the earliest and simplest commercial form of which is represented by the De Laval. In this the steam is first expanded to full velocity through expanding nozzles and then impinges on side entrance buckets, giving up some of its velocity to the bucket wheels. These turbines are of small size and, when running condensing, work on low vacuum. Between 150 pounds gauge pressure and atmospheric pressure the available energy in one pound of steam is 135,000 foot pounds and the corresponding velocity when expanded between



Interior view of Station "A" before turbine installation

these limits is 2,940 feet per second. The available energy between 150 pounds gauge-pressure and 24 inches vacuum with a single expansion is 207,000 foot pounds and corresponds to a velocity of 3,640 feet per second.

As the maximum economy of the turbine is given when the peripheral velocity is one-half that of the steam, it will be seen that the above values are too high for direct connection of the De Laval turbine to electric generators, pumps or other purposes, and in this type, therefore, in order to obtain a satisfactory steam consumption it is necessary to use a high-speed reduction gear between the turbine and the machine it drives. In the Curtis turbine the economical peripheral velocity of the turbine wheels is reduced by the use of a number of stages, each of which makes use of a proportional part of the available energy of the steam, and each of these stages also has several wheels by which the velocity is abstracted fractionally. As an example, in a 5-stage turbine consisting of two bucket wheels per stage, the available energy per stage will be approximately 55,000 foot pounds, giving a nozzle velocity of 1,875 feet per second, and if half of this amount is divided equally between the two wheels, the theoretical bucket velocity for maximum economy will be seen to be 468 feet per second. The practical bucket velocities in the Curtis turbine as a rule exceed 430 feet per second.

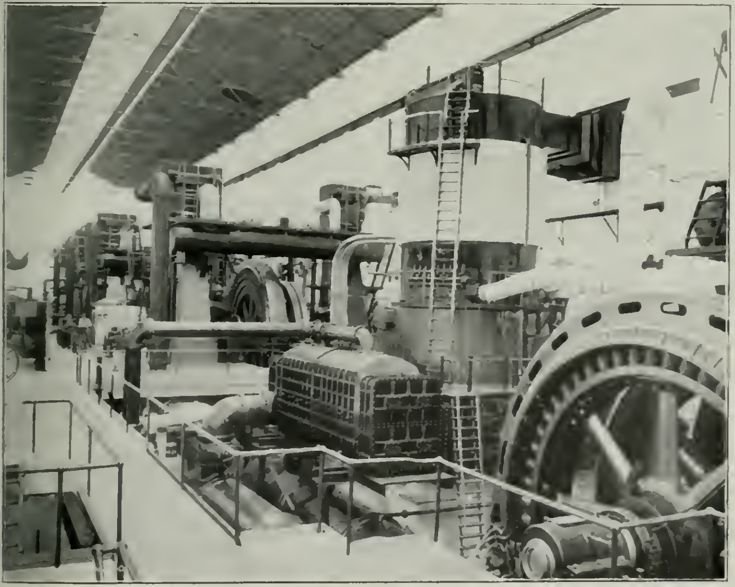
The stage pressures in a 6-stage Curtis turbine, assuming equal division of work in each stage, based on 185 pounds gauge steam pressure, 28½ inches vacuum (30 inches barometer) saturated steam, are as follows:

STAGE.	STAGE PRESSURE LBS. ABSOLUTE.
THROTTLE.	200
1	90
2	40
3	15.4
4	6.1
5	2.2
6	0.75

The average available energy under the above conditions is 50,000 feet pounds per stage and average steam velocity 1,780 feet per second. The average bucket speed in a 6-stage turbine will be 430 feet per second. The buckets vary in length, according to the expansion of the steam; those in the first wheel of the first stage being 1 inch in length and in the last wheel of the 6th stage, 14¾ inches in length.

The revolving parts of the turbine consist of the vertical shaft, on which are placed the bucket wheels and the generator fields. Its total weight is approximately 125 tons, which revolves on the end of the 16-inch shafts, upon which is arranged a bearing known as the step. This step is supplied with oil at a pressure of 1,000 pounds per square inch, which is sufficient to raise the entire weight, and thus the 125-ton structure revolves on a thin film of oil. The friction of the revolving part is so small that one man can turn it by hand, with comparative ease, when oil is supplied to the step bearing.

The operation of the steam turbine is as simple as the water wheel, and is particularly adapted to running in parallel with other apparatus.



Interior view of Station "A" after first turbine installation

Making Room for the Turbine

By JAS. H. WISE, Assistant General Manager.

Jas. H Wise

In order to prepare the foundation for the new 15,000 kilowatt steam turbine at Station "A" it was necessary to remove about two hundred cubic yards of concrete, formerly the foundation for No. 5 reciprocating engine. To do this without in any way endangering the switchboard, which was but a few feet distant, or the other equipment in the powerhouse, including the 12,000 kilowatt Curtis turbine, which was less than twenty feet away, quite a problem was presented.

The unreliability of giant powder is well known, for while it may be handled by experienced men it will not act uniformly, because when the powder has been in stock for a considerable time the nitro-glycerine works from the top to the bottom layers, thus making a big difference in the powder though contained in the same box. So, as it was imperative that the operation of the plant should be in no way jeopardized through this work, the use of a channeling machine was decided upon, and the result was success.

A contract was placed with the Colusa Sand Stone Co. for the removal of a total of 195 cubic yards, the time for removal not to exceed four weeks and the concrete to be cut in blocks not exceeding twenty-five tons. The blocks and fragments were to be removed by the Pacific Gas & Electric Company as fast

One chunk of this concrete weighed 39 tons

Where the hole was made

as loosened. The method followed was to run vertical cuts three or four feet apart, as shown in the attached photograph, from the top of the concrete blocks to the floor line with the channeling machine. Machine drills were used for driving a series of horizontal holes, and the masses were then loosened from the foundation by the plug and feathering method. Steam was supplied to the channeling machine as well as the drills from the company's boilers at 100 pounds pressure.

Work was carried on uninterruptedly from August 25th to September 18th, twenty-five working days. The largest piece of concrete removed contained 20.75 cubic yards, and weighed approximately thirty-nine tons. The sizes of these pieces are shown in photograph No. 3. The concrete was of an excellent quality and extremely hard, showing that a rich mixture had been used, and its being traversed by anchor bolts in vertical planes added to the difficulty in making the channel cuts.

The method used was unique and especially suitable for this kind of work, where flying fragments of concrete in an operating plant are exceedingly dangerous, and where 20,000 kilowatts in reciprocating and turbine-driven generators supply such an important load as the city of San Francisco.

Channeling Machine at Work

* * *

Official announcement is made of the purchase by the Pacific Gas & Electric Company of the property and business of the South San Francisco Power & Light Company. This means the establishment of a new district to be known as the South San Francisco District and which will take in all the power lines between Millbrae and the San Francisco-Santa Mateo County line. Offices have been engaged in the Metropolitan Hall Building in South San Francisco and Frank P. Edwards, formerly General Manager of the South San Francisco Power & Light Company, is retained as District Manager.

Testing the Turbo-Generator

By EDWIN A. ROGERS, O. & M. Department, Steam Section.

E. A. Rogers

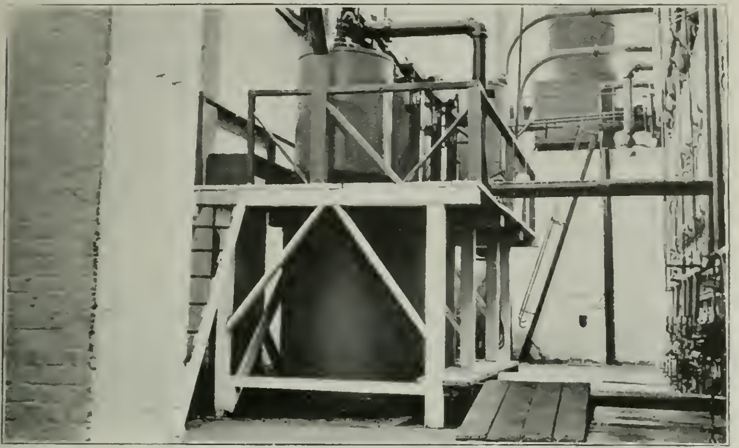
Among the many events of interest which have taken place in the company recently, the installation of two of the biggest steam turbines on the coast have quite an important part. The testing of these turbines, with which this article is intended to deal, is a very interesting proposition, not only to the engineer but also to people in other lines of work.

When we sit at home and read by an electric light, only a very few people give a thought to the source of that light or how nature's forces must be transformed to give it. The current may come from one of the hydro-electric plants or it may come from a steam-station, but in either case the idea is to give constant and reliable energy of the highest efficiency possible and with the greatest economy. The turbine has proved a big help to us in both directions. Twenty years ago an engine which could furnish a horsepower hour on a steam consumption of 20 pounds was considered a good machine. Today we have the big turbine at Station "A" giving us a horsepower hour 10½ pounds. Thus we have accomplished a saving of nearly one-half of our fuel bill. That we have still a long way to go however, may be seen when we realize that in a modern steam plant of high efficiency between 80 and 85 per cent of the energy in the fuel oil escapes by the smoke-stack or is carried away in the condenser water.

In testing a turbo-generator set the things to determine are the amount of electrical energy generated during a given length of time and the amount of steam taken by the turbine during this time. A turbine is guaranteed to do a kilowatt hour on a certain amount of steam consumed under given conditions of initial steam pressure, degree of superheat in the steam and vacuum in the condenser. It is the determining of these quantities which we have to do in a test.

To measure the output of the generator there are two methods used, but it is necessary to describe only one, the more accurate of the two, known as the three-meter method. In this method three recording wattmeters are used, one for each phase. By means of potential and current transformers a low ratio of the power given out by the generator is given to the three meters. As the ratio between the actual power and the meter ratings is known, the power is easily calculated, the sum of the three meters on the phases being the total. As a check on the meters mentioned, readings are taken at regular intervals on an indicating wattmeter; but these readings are not sufficiently accurate to use in figuring the results.

For determining the amount of steam used the water from the condenser is weighed before being sent back to the boilers. The weighing of this water is no easy task. At Station "A" four large tanks are used, each capable of holding about 2,000 pounds of water. Each tank is placed on a platform scales and the whole apparatus stands on a platform about 7 feet above the floor, underneath which is placed a large receiving tank. A 5-inch discharge pipe with a quick opening valve takes the water from the bottom of each tank into the receiving tank from which it flows to the feed pumps. The water from the turbine condenser is brought in a 6-inch pipe which runs above the weighing tanks, and over each of these a tee is put on the line with a quick opening valve below it. Illustration No. 1 shows the general arrangement of the weighing apparatus and No. 2 shows the tops of tanks numbers 1, 2 and 3 with the pipe and valves which control the water to be weighed.



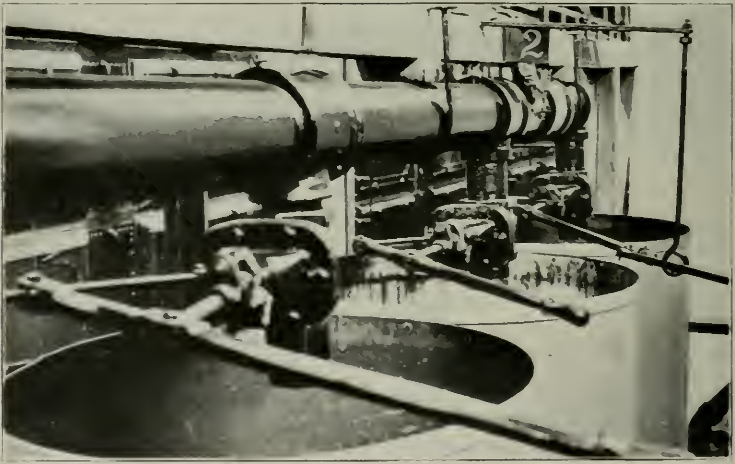
Apparatus for weighing water used by turbine

When a test is to be made a man is stationed at each scales to weigh and record the amount of water, and two men are below the platform to open the discharge valves on the tanks as they are weighed. One man operates the inlet valves which give the water to the different tanks. Previous to starting the test all the water is allowed to run into and directly out of one of the tanks. No. 4 for example. The discharge valves on Nos. 1, 2 and 3 are closed and the weights of the empty tanks are taken in order that the net weight of water may be determined. At the instant of starting the test, inlet valve No. 1 is opened and No. 4 shut. No. 1 is now filled to a mark about 3 inches from the top and then No. 2 valve is open and No. 1 shut. When No. 2 is filled the valve on No. 3 is opened and No. 2 shut, and so on through No. 4 and back to No. 1 again. Now as soon as No. 1 tank is full the man at the scales weighs it and then gives the signal to one of the men below to open the discharge valve. The tank is allowed to drain thoroughly, in order that the tare weight will be constant, then the discharge valve is shut, so that by the time No. 4 tank is full No. 1 will be ready to receive the water again.

Some idea of the amount of work to be accomplished may be obtained from actual figures taken during the full load test on the 15,000 kilowatt turbine. The test was of 4 hours duration, and during all that time the water was turned into No. 1 tank every two minutes and five seconds. That meant we had nearly 4,000 pounds of water to be weighed every minute. It was hard to convince one of the men at the scales that this amount of water was going into the turbine as steam at a pressure of 175 pounds and 100 degrees superheat. With steam at the gauge-pressure and superheat recorded the amount of heat entering the turbine in twelve hours would be just about equal to the heating value of the gas stored in the new gas-holder at the Potrero works, when it is full.

The acceptance tests on the big turbines must be made with great accuracy, and many corrections have to be made on the actual test conditions. The electric meters for measuring the power output are carefully tested before and after. The scales on which the water is weighed are tested by means of 50 pound standard weights, both before and after, enough weights being used to calibrate the scales at about the weight shown when the tank is full of water. Most important of all, however, are the corrections which have to be made for the temperature of the superheated steam, the initial pressure on the steam and the vacuum in the condenser. These items are important, as a slight variation makes quite a difference in the performance of the turbine. For example, take the vacuum in the condenser; 1 inch of mercury difference in the vacuum will give a difference of about 1 pound in the water rate. That is, a turbine which will give a kilowatt hour on 15 pounds of steam at 29 inches of vacuum would require 16 pounds of steam if the vacuum were only 28 inches. In the same manner a difference of 12½ degrees in the superheat temperature will give a difference of 1 per cent in the water rate which amounts to .15 of a pound when the actual water used is 15 pounds per kilowatt. Consequently, it is necessary that our vacuum, initial pressure, and steam temperature be very accurately determined.

For the steam pressure a gauge is tested with a dead-weight tester so that the correction is only a matter of the difference between the gauge-reading and the actual pressure. For the superheat and vacuum the results are not so easily arrived at. For the superheat, a thermometer well is placed in the steam pipe of the turbine and a high reading thermometer put in the well. Suppose now that this thermometer is immersed to the 100 degree Fahrenheit reading and that the temperature of the steam is 500 degrees. We have 400 degrees of the mercury thread exposed, and from this thread the heat is radiated out through the stem and the mercury contracts, giving a lower temperature reading than should be recorded. To correct this the temperature of the stem must be taken and by means of a suitable formula the amount to be



Top View of Weighing Tanks Shown Above

added to the superheat reading is determined. During one of our tests this correction was as high as 9 degrees Fahrenheit or three-fourths of one per cent in the water rate.

The vacuum corrections are still more complicated, for here the readings must be referred to a barometer of 30 inches as well as corrected for temperature. Two mercury columns are used on the condenser and the average reading is taken in the final results. The temperature of the mercury column is obtained in each case and corrections made for radiation from the column, the same as in the case of the superheat thermometer except that a different formula is used. After this correction has been made the column reading must be corrected to read as they would have done had the barometer reading been 30 inches. To do this a mercurial barometer which has been carefully tested is placed near the turbine and readings taken throughout the test. Corrections are made on it for column temperature and then, when the true reading has been obtained, the difference between this reading and 30 inches is either added or subtracted from the column readings on the condenser, according to whether the correct barometer reading is below or above 30 inches. These corrections when combined may add to the water rate of the turbine or they may subtract from it, depending on whether the conditions of the test are better or worse than the guarantee conditions of superheat, initial pressure and vacuum. In one actual case the corrections added 6.66 per cent to the water rate, while in another the rate was reduced by 3.76 per cent.

In testing the turbines at Station "A", San Francisco, and Station "C", Oakland, three four-hour runs were made on each machine. At Station "A" the loads for the runs were 7,500, 12,000 and 15,000 kilowatts, while in Oakland the loads were 7,500, 10,000 and 12,000 kilowatts. By making three tests we had three points on the efficiency curve of each turbine, thus making it possible to determine the approximate efficiency at any load from zero to maximum capacity. In spite of the fact that its capacity is 25 per cent greater, the turbine at "A" is only slightly larger than the Oakland unit. It is the service that counts.

* * *

Asst. Genl. Manager Wise announces the following changes in territory of Water Districts

The Nevada Water District will include all of the lakes, reservoirs, canals, and distributing systems in Nevada County west of the 5.8-mile point on the main South Yuba Canal.

The Colfax Water District will include all of the lakes, reservoirs and canals on the South Yuba water shed east of the 5.8-mile point on the main canal, all of the territory covered by the Boardman Canal system east and north of the 35-mile post, including the town of Colfax; all of the territory covered by the Towle system and all of the territory covered by the Bear River Canal system east and north of the 7-mile post below Colfax.

The Placer Water District will include all of the lakes, reservoirs, canals and distributing systems of the Boardman Canal system west and south of the 35-mile post, all of the Bear River Canal system west and south of the 7-mile post, and all of the Gold Hill Canal system.

The Pacific Gas and Electric Company now makes no charge for service connections to any building for either gas or electricity except where the consumer is more than 100 feet distant from gas or electric mains. This is a new order issued from the President's Office and takes effect March 1st.

The Steam Plant as a Guarantee to the Public

By JOSEPH P. BALOUN, Chief Draftsman.

J. P. Baloun

Within the recollection of most of us is the first time we passed by the open door of a power-station, and saw the ceaseless travel of the belt and rope-driven dynamo.

We all experienced the sensation of the static electric spark which was produced when the engineer in charge made us hold the knuckles of our hand near the rapidly moving belt. This phenomenon was all the more noticeable as we stood on a perfectly dry floor and held our finger tips very close but not quite touching the surface of the belt.

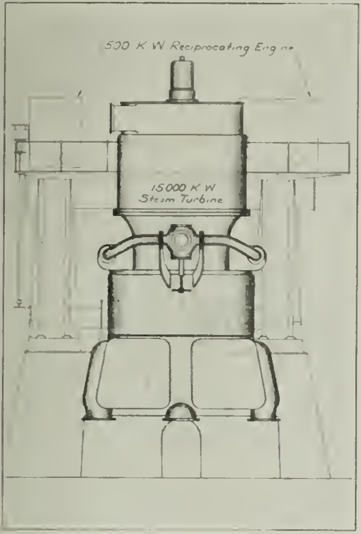
Even today, away from the larger cities we find here and there an isolated plant with a transmission drive for its generators. This intermediate step in the transformation from mechanical or steam energy to that of electrical is made by various types of gearing, including the so-called silent chain, rubber, leather or other prepared belting, or stranded cable or rope.

All of these various types of transmission, however, are inefficient as compared to their successor, the direct-connected drive. This is made through a coupling flexible or rigid, as structural reasons may demand, the steam prime mover being axially in line with the shaft of the generator and connected thereto by one or the other. It is necessary to make these couplings of an insulated type, in order to prevent electricity being conducted from the shaft of the generator to the engine parts. A later arrangement is to thoroughly insulate the commutator, or the collector rings, from the shaft.

The steam engine advanced along progressive and economical lines, taking in the horizontal, diagonal or vertical type, in both simple and multiple expansion designs, until a still more compact and satisfactory solution of the transmission problem was found in the direct mounting of the generator rotor on the engine crank or main shaft. This arrangement was placed on the market as the greatest accomplishment in steam engineering and electric generator practice, and gave to the engineering world the suggestion of completeness of design and the nearest approach to possible perfection.

The development of the high-speed direct-connected generator also furnished the water-wheel experts with a still more economical unit for the generation of electricity. This in turn put up to the hydraulic engineer the problem of furnishing a continuous supply of water for the hydro-electric generation of power. The result is found in the mountain power-houses of today. The opening of a high-pressure hydraulic gate valve is as simple as opening an engine throttle. It admits the water through a nozzle and allows it to play upon the buckets of a water-wheel, on the shaft of which the generator is direct connected. But the needle control for the water supply from the tip of the nozzle is far more complicated than an engine throttle, and still more delicate and sensitive to the fluctuations in the load.

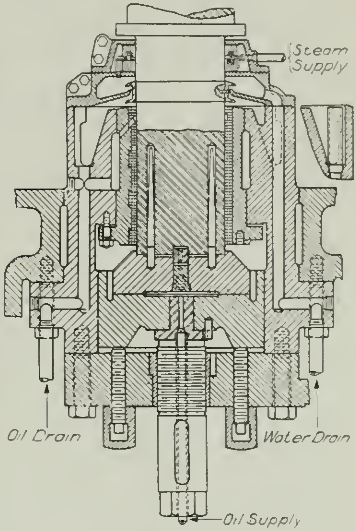
We find, therefore, that as the power and lighting stations of the large cities confine themselves to the improvement of the engine-driven generator to serve their customers, towns favorably situated near the mountain lakes were installing hydro-electric plants for this purpose. On the one-hand, the steam-plant engineer had to consider, beside his engine unit, the boilers, fuel, condensers, heaters, pumps, etc.; on the other hand, the water-power engineer had to consider others of great importance, as his water-shed, reservoir, dam, canals, flumes, pipe lines, etc. Therefore, with an immense water-shed and a properly designed reservoir and dam site, the hydroelectric installation soon made great strides over the distant city engine plant, and, although the cost of a line for distributing the electric current in other cities was no small item, it gradually underbid the steam plant in competition for contracts in the cities.



Turbine smaller than an engine

Then the steam plant, instead of retiring from the field, set about to find a cheaper method of generating electric power. This was obtained by a rotative engine instead of a reciprocating one. Today the steam turbine, a type of rotary engine, has been placed on the market, and has superseded all classes of so-called steam engines, without exception, for economy, capacity and endurance.

It is needless to note that a steam-station is under cover all of the year round, and so are all of its auxiliaries. On the other hand, the vast water-sheds of the hydro-electric stations are of little service during the summer months in this State. During the winter time the heavy rains give the flume and ditch-tenders much concern, for, though all of these construction details have been given the best of attention, anchorages of all pipe lines and other footings made on bedrock and amply reinforced with concrete piers and abutments, a rainstorm may produce a settlement at one part or a displacement at another section of this seemingly perfect system. Nature and the elements necessitate a large force of men constantly on duty to prevent a shut-down of the water-power plants. Thus, the lighting and power company has an enormous expense account during its summer months to meet weaknesses in construction and the caprices of nature. The destruction of our forests also tends to reduce our present enormous water supply.



Step-bearing for turbine

During the shut-down periods in the water power plants, due in the winter probably to high water, or other accidents, or in the summer to a shortage of water, the load despatcher of the distributing company finds that he can call for power from the steam auxiliary stations, which, though not so economical, are more reliable for service three hundred and sixty-five days in the year. Through this extra expense incurred by the company, the customers of a large lighting and power concern, are guaranteed continuity of service.

Though the pipe lines of the water-power stations are often installed in duplicate, and the transmission lines interconnected with other lines from other power stations, there comes even with all of these precautionary measures a period when the alert load despatcher is glad to know that he can get a definite number of kilowatts from his steam auxiliary stations. It makes him feel easier.

* * *

Bret Harte and "The Master"

The Dickens Centennial now being celebrated in England recalls many an hour brightened by the one writer who above all others knew how to touch the human heart. The following tribute from the pen of the Dickens of America is worth reproduction at this time. Among Bret Harte's poems there is found none better than his "Dickens in Camp."

Among the pines the moon was slowly drifting,
The river sang below;
The dim Sierras, far beyond, uplifting
Their minarets of snow.

The roaring campfire, with rude humor, painted
The ruddy tints of health
On haggard face and form that drooped and fainted
In the fierce race for wealth.

Till one arose, and from his packs' scant treasure
A hoarded volume drew,
And cards were dropped from hands of listless leisure
To hear the tale anew.

And then, while round them shadows gathered faster,
And as the firelight fell,
He read aloud the book wherein the Master
Had writ of "Little Nell."

Perhaps 'twas boyish fancy—for the reader
Was youngest of them all—
But as he read, from clustering pine and cedar
A silence seemed to fall.

The fir-trees, gathering closer in the shadows,
Listened in every spray,
While the whole camp, with "Nell" on English meadows
Wandered and lost their way.

And so in mountain solitudes—o'er taken
As by some spell divine—
Their cares dropped from them like the needles shaken
From out the gusty pine.

Lost is that camp and wasted all its fire:
And he who wrought that spell?—
Ah! towering pine and stately Kentish spire,
Ye have one tale to tell!

Lost is that camp, but let its fragrant story
Blend with the breath that thrills
With a hop-vine's incense all the pensive glory
That fills the Kentish hills.

And on that grave where English oak and holly
And laurel wreaths entwine,
Deem it not all a too presumptuous folly,
This spray of Western pine!

July, 1870. BRET HARTE

Gumption

By F. G. B.

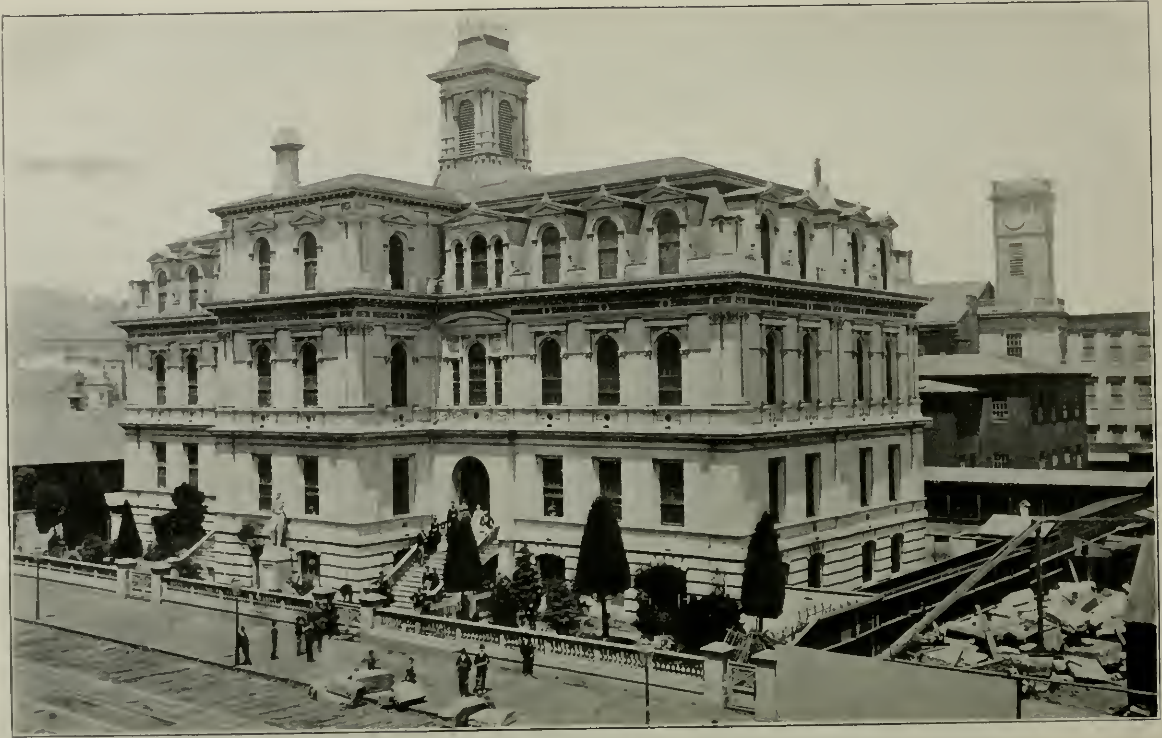
A railroad was built during last Summer across the field of Farmer Jones. Jones had a large red bull that was Lord of this field for several years, but while the railroad was being built the bull was on the mountain range with the other cattle. When he came back to his old range and saw an engine and a train start across the field he broke through the fence and went to meet the engine—head on. You can imagine what happened to this bull that lacked "gumption." Especially in a large corporation this story of the bull that had no "Gumption" is often repeated.

It is hard to tell just what is "Gumption," but it means doing the natural or obvious and sensible thing. It means the application of common sense—that is Gumption—*intuitively*. It means, first, of course, a thorough knowledge of yourself and quick action of your abilities to the solution of a problem often suddenly presented. It means a regard for the organization with which you are working, and, when you see a train of actions coming across what you consider your own field, don't meet it like the bull, but step aside and let it go by and adjust yourself to the new condition. If you are not willing to do this, don't try to disrupt the engine, but go to some other field and do your grazing.

"Gumption" means doing the right thing at the right time and saying the right thing at the right time—which often means to keep your mouth shut. My friend, Ben Pearson, tells the folowing story which illustrates the general lack of "Gumption."

"A certain man, the father of a family of boys and girls, suddenly disappeared and no trace of him could be found for several days. Three days after his disappearance a man was found in the bay bearing a resemblance to the missing man. The local undertaker took charge of the body and sent for one of the boys to identify it. The son pronounced the body to be that of his missing father. Accordingly the arrangements for the funeral were made, the family being present, except one daughter whose train was delayed. As the Preacher finished the sermon and the undertaker was preparing to close the coffin, the other daughter arrived. Being overcome by the scene she threw herself on the coffin and hysterically called on her father to speak to her. In doing so she disarranged the support to the dead man's chin, which dropped down, showing a gold filling, which the girl knew her father did not have. She shrieked that it was not her father—and upon closer examination the mistake was verified and the family and other mourners filed out. The undertaker was very much put out about the matter and lost his temper. Walking by the coffin he flicked the dead man's ear and said, 'You d—— fool! If you had only kept your mouth shut a minute longer you would have had a decent burial—now I lose a hundred dollars and you go to the Potter's Field.' "

If you don't have "Gumption" you will never "carry a mesage to Garcia." "Gumption" is the result of your daily method of thinking, concluding and acting. It comes from the habit of relegating unessentials, reaching correct conclusions, and doing the thing that counts—*and doing it quickly*. "Gumption" means the application of strength, courage and ability on your own initiative—on the spur of the moment. It is what makes "class" in emergency actions. Common sense is necessary every day when you have time to use it—but when there is an accident and something must be done at once use "Gumption."



Old Lincoln School Building on Fifth Street, near Market, in San Francisco. Destroyed in the Conflagration of April, 1906.

Photo by Turrill & Miller, San Francisco.

Will Replace the Old Statue

Lincoln Grammar School "Old Boys" Get Together for an Earnest Purpose

Memories of early days in San Francisco have been revived by activities on the part of the Lincoln Grammar School Association, a society composed of men who in the long ago were boys and tramped unwillingly to the old school on Fifth Street, near Market.

Members of this Association got together at a dinner in San Francisco recently and launched a project for the erection of a monument to Abraham Lincoln to replace that which stood in front of the old Lincoln School Building and perished with it in the conflagration of 1906. The cost of this is to be subscribed entirely by the membership of the Association, which is thus doing its part toward the creation of a city beautiful for visitors to the Panama-Pacific Exposition in 1915 to see and wonder at.

At this dinner the general conversation was mostly reminiscent. Old friendships were renewed and events and incidents long consigned to the forgotten past were recalled to memory. Old Lincoln School has an historical value, for not only was it the first educational institution in the country to be named after the martyred President, but it is the boast of the "old boys" also that the statue of Lincoln which stood in front of the school was the first of its kind. Among the men who received their early training there, many have become world famous. They are scattered all over the globe mostly, but there are a goodly few still left in San Francisco and they are well to the front in commercial and professional life. The Association of "old boys" was organized three years ago and it has been growing steadily ever since, and now permanent organization has been formed for the purpose of holding annual gatherings and taking other steps toward the perpetuation of Lincoln School traditions. The Association is not confined to alumni, but takes in any and all who attended old Lincoln School for any length of time from the date of its opening in 1865.

The new Lincoln School building which has replaced the old stands at the corner of Harrison and Fourth Streets. An unusual event in connection with this was the laying of the corner stone after the building was completed. In this were deposited school records, photographs and memoranda of all kinds. And now there is to be a new statue which, as far as it is possible to make it, will be a replica of the old, which was the work of P. Mazarra, a San Francisco sculptor. Alex. Goldstein of the class of 1869 is Chairman of the Committee appointed to carry out the aims of the association as far as the new statue is concerned. It is estimated that during the life of the old school building more than 50,000 pupils attended, so that a very modest subscription from each of these will insure the success of the enterprise. The following communication speaks for itself:

THE WHITE HOUSE, SAN FRANCISCO.
MARCH 8TH, 1912.

MR. JOHN A. BRITTON,
President, Lincoln School Association, City.

My dear Mr. Britton:—

A movement under your auspices has been started to erect a monument to Lincoln, or rather replace the one destroyed in the disaster of 1906.

I participated in the inauguration of the first one and hope to do the same as soon as possible at the second.

The initiative of the Committee, with its names of men all grown up in our dear city, ought to find a hearty response, and should you deem a contribution, however small, worthy of the cause, I beg you to accept the

Statue of Lincoln in front of the old school, which it is proposed now to reproduce as far as possible
Photo by Turrill & Miller, San Francisco.

enclosed check for Two Hundred 00 100 Dollars as my own.

Very truly yours,
(Signed) R. WEILL,
ex-School Director.

Needless to say, this generous contribution from one of San Francisco's most public-spirited citizens was gratefully accepted.

Old Lincoln School boys not yet enrolled in the Association are invited to communicate with the Secretary, Eugene G. L. Hoeber, 777 Mission Street, San Francisco. Chas. B. Turrill has been elected historian of the Association and is collecting a mass of valuable Lincolniana which not only will be valuable to the Association but will be an important feature in the mass of historical data that will be equally sought after by visitors to San Francisco in 1915.

The officers and directors of the Lincoln Grammar School Association are:

John A. Britton, President; Alex. W. Robertson, 1st Vice-President; E. Frank Green, 2nd Vice-President; Thos. P. Burne, Treasurer; Eugene G. L. Hoeber, Secretary; Chas. B. Turrill, Historical Secretary.

DIRECTORS

Geo. R. Burdick, Al. Couper, Jos. M. Greenberg, Arthur L. Levinsky, Chas. E. Miller, Geo. M. Cumming, Alex. Goldstein, Marcus S. Koshland, Geo. H. Luchsinger, Chas. Van Orden, Frank H. DeGuerre.

Fresno Employees Organize Club

Under the energetic and able direction of Manager W. M. Henderson, the employees of Fresno District of the Pacific Gas & Electric Company have organized a permanent association for educational and social purposes.

Notice of this was given in the February issue of the magazine, but what was then in embryo has now assumed definite shape. Permanent organization was effected at a meeting in the Fresno office on the evening of Thursday, February 15th. There was an attendance of thirty-two and everything went with a bang. Officers elected:

President James Beveridge

President, James Beveridge; Vice-President, O. R. Shirkey; Secretary, Martin Quinlan; Treasurer, Harry Foster; Librarian, W. M. Henderson; Publicity Manager, C. A. Edgecomb; Sergeant-at-Arms, Peter Smith.

An idea that is likely to work out to great advantage is the question box, which has been placed in a conspicuous position on the office counter with the following notice inscribed thereon:

"Any persons desiring information pertaining to the gas business will please drop their questions in this box."

It will be the business of the Question Box Committee to answer any inquiries that may be found in the box as well as others that may be asked from time to time by members of the association. Question boxes have also been placed in the fitters' quarters and at the gas works for the benefit of the employees.

Martin Quinlan, Secretary

Here is enterprise in the right direction. What Fresno has done other districts might do to advantage. It is just this get-together spirit that makes for perfect organization.

Nothing Like a Good Start!

Pacific Gas and Electric Company's Baseball Nine Opens the Season With a Victory

The Pacific Gas and Electric Co. team defeated the Freshman team of the University of California at Freeman's Park in Oakland, Saturday, March 2nd, the score being 2 to 1.

It was anybody's game until the last player was retired. In the 9th inning one of the students reached 2nd base with only one out, but the good battery work of Scanlon and Mensing, backed up by sharp fielding prevented this player from scoring.

Feeney pitched the first six innings and allowed but two hits; Scanlon then went in and twirled shut-out ball the remaining three innings, striking out five batsmen.

The Company's team was strengthened by Melchoir, who played right field last season with the San Francisco Coast League team. He drove in our two runs by timely hitting, scoring Gilhooley in the first and Fitzhenry in the third inning.

The old hidden ball trick was neatly played by Swan who threw to 1st base and caught Oakes napping, much to the disgust of that player and to the amusement of the large (?) crowd present.

Melbourne, our hustling Manager, has promised plenty of games and the players look forward to a busy season.

Following is the complete score:

FRESHMAN TEAM, U. OF C.

	A.B.	R.	H.	P.O.	A.	E.
Hunt, cf	4	0	0	4	0	0
Schon, 2nd	4	0	0	1	0	0
Rice, rf	4	0	1	1	0	0
Sherrard, ss	4	0	1	0	5	1
Oakes, 3rd	4	0	0	3	0	1
Slyter, 1st	2	1	0	8	0	1
Robinson, lf	4	0	0	1	0	0
Glenny, c	3	0	1	6	1	0
Heward, p	3	0	0	0	1	0
Totals	32	1	3	24	7	3

PACIFIC GAS AND ELECTRIC CO.

	A.B.	R.	H.	P.O.	A.	E.
Gilhooley, 3rd	4	1	2	1	2	0
Fitzhenry, 1st	4	1	1	15	0	0
Swan, 2nd	4	0	0	2	3	1
Melchoir, rf	4	0	2	0	0	0
Trowbridge, ss	4	0	2	0	3	1
Feeney, p	3	0	1	0	2	0
Coughlin, lf	3	0	0	0	0	0
Wrinkle, cf	4	0	0	2	0	1
Mensing, c	4	0	1	7	2	0
Scanlon, p	1	0	0	0	0	0
Totals	35	2	9	27	12	3

RUNS AND HITS BY INNINGS.

P. G. & E. Co..	1	0	1	0	0	0	0	0		—2
Hits	1	1	2	2	2	0	1	0		—9
U. of C.	0	1	0	0	0	0	0	0	0	—1
Hits	0	1	1	0	0	0	0	1	0	—3

SUMMARY.

Innings pitched by Feeney, 6; Scanlon, 3.

Base on balls off Heward, 1; off Scanlon, 1.

Struck-out by Feeney, 2; by Scanlon, 5; by Heward, 4.

Hit by pitcher, Slyter, 2.

Stolen bases, Melchoir, 2; Gilhooley, 1.

Time of game—1 hr. 40 min.

Umpire—Melbourne.

And Just to Keep Up the Good Work!

Saturday afternoon, March 9th, the Company's team played its second game this season, winning from the Army Club at the Presidio in an easy manner. The game was called after seven innings of rather uninteresting ball had been played.

Scanlon had things his own way and let the soldiers down with only three hits. Swan had a busy time around second base, handling ten chances without an error, while at bat he ripped out two doubles and scored three runs. Coughlin and Wrinkle also connected for two-base hits.

M. MENSING.

PACIFIC COAST GAS ASSOCIATION

OFFICE OF THE SECRETARY
445 SUTTER STREET, SAN FRANCISCO
SAN FRANCISCO, March 15th, 1912.

"LEST WE FORGET"

TWENTIETH ANNUAL CONVENTION

SAN DIEGO, CALIFORNIA, SEPTEMBER 17th, 18th, 19th, 1912

RED LETTER DAYS

September 17th, 18th, 19th, 1912

To the Members of the
Pacific Coast Gas Association:

Make your plans so that you can be in attendance at this meeting. Our President, Mr. Wm. Baurhyte, of Los Angeles, at this early date predicts that the TWENTIETH CONVENTION of the Association will excel all previous meetings,—not only in the attendance, character of papers to be read, new wrinkles, experience, and novelties, but also in the arrangements which are being made for the entertainment of the members and their families by our San Diego friends.

Our Wrinkle, Experience, and Novelty Editors are keen to hear from all members, so that if you have anything to impart to them DO IT NOW.

MR. F. C. MILLARD, *Wrinkle Editor,*
425 Merchants Trust Building,
Los Angeles, California.

MR. WALLACE H. FOSTER, *Experience Editor,*
Pacific Gas and Electric Company,
San Rafael, California.

MR. R. L. CLARK, *Novelty Editor,*
San Diego Consolidated Gas and Electric Co.,
San Diego, California.

It will be of more than passing interest to the members to know that subscriptions to our fund being raised for the establishment of a Chair of Gas Engineering in the University of California now amount to $2,476.00; and we will in due course advise you more fully in this matter, with a revised list of subscribers to said fund.

What we desire to impress upon all members is the TIME, PLACE, and DATE.

TIME: SEPTEMBER, 1912.
PLACE: SAN DIEGO, CALIF.
DATE: 17th, 18th, 19.

Yours very truly,

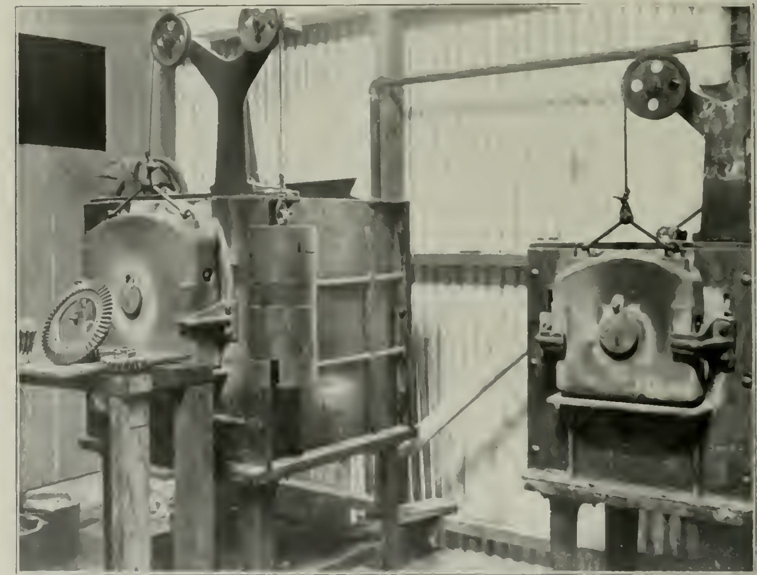
JOHN A. BRITTON,
Secretary.

Gas-Fired Case-Hardening Furnaces

By JOHN B. REDD, Industrial Fuel Engineer.

J. B. Redd

Case-hardening is a process of changing the surface of small machine parts made from wrought iron or machine steel to a hard steel, while the interior of the parts remains soft and tough, its natural condition. Machinery steel comes in a number of grades, and is much less expensive than tool steel, which contains a larger per cent of carbon. The parts are placed in special cast-iron boxes, care being taken that each piece is entirely surrounded with ground bone, hone, hoof clippings or other carbon producing material, in order that the parts do not touch the sides of the receptacle or other pieces.



When only small pieces are to be case-hardened a piece of pipe can be used as a receptacle. After the parts are carefully packed the receptacles are sealed with asbestos cement or fire clay and placed in the furnace ready for firing. They are then subjected to a uniform temperature of from 1300 to 1500 degress Fahrenheit according to kind of steel being treated. If the temperature varies or is excessive the metal is liable to crystallize, if the temperature is too low carbonization is not effective. A constant temperature is maintained for from three to six hours, the length of time depending upon the depth of penetration desired.

Gas is the best possible fuel for this purpose as perfect control can be had over the furnace, and a steady heat maintained with the use of an electric pyrometer, which correctly registers the oven temperature, and there is no danger of spoiling the parts by varying heat.

The articles after being heated, are quenched in an oil or water bath, or sometimes surfaced cooled in water and the cooling finished in an oil bath.

Soft steel hardens more when plunged into brine and less when quenched in oil.

The illustration shows two sizes of case-hardening furnaces recently installed at the Pacific Gear and Tool Company's new building, 1135 Folsom Street, which are giving excellent results. A number of case-hardened gear are shown in front of the large furnace, these are made in a number of different sizes.

The proper temperature can be secured with the gas furnaces in a short period of time, and maintained by an occasional turn of an air or gas-valve, allowing the operator to devote most of his time to other work. There is no loss of time in starting fires or waste of fuel after the receptacles are removed from these furnaces.

The maximum gas consumption of the larger furnace is 450 cubic feet per hour, but this of course, can be regulated according to size and number of parts heated. By slight attention the cost of gas fuel is made very economical.

Resuscitation From Electric Shock

The first meeting of the Commission on Resuscitation from Electric Shock was held in the board room of the National Electric Light Association, New York, on February 22. This commission was organized upon the initiative of the National Electric Light Association, and has for a purpose the study of electric shock and the preparation of a set of rules for first aid in case of electrical accident. The commission is composed of members of the American Medical Association, National Electric Light Association and American Institute of Electrical Engineers, as follows:

Nominated by the American Medical Association: Dr. W. B. Cannon, professor of physiology, Harvard University, chairman; Dr. George W. Crile, professor of surgery, Western Reserve University; Dr. Yandell Henderson, professor of physiology, Yale University; Dr. S. J. Meltzer, Rockefeller Institute for Medical Research, New York; Mr. W. D. Weaver, editor Electrical World, secretary. Nominated by National Electric Light Association: Dr. E. A. Spitzka, professor of general anatomy, Jefferson Medical College; Mr. W. C. L. Eglin, electrical engineer Philadelphia Electric Company. Nominated by American Institute of Electrical Engineers: Dr. Elihu Thomson, electrician, General Electric Company; Dr. A. E. Kennelly, professor of electrical engineering, Harvard University.

At the meeting in New York City the medical members of the commission unanimously advocated the Schaefer, or prone, method as the best means in the hands of laymen for maintaining respirations in victims of electric shock, and the commission formally voted to recommend this method. A chart is now being prepared which will give details of first aid in cases of electric accidents and will describe fully the method of applying artificial respiration. This chart will be issued under the auspices of the National Electric Light Association.

Journal of Electricity, Power and Gas, March 9.

Perfect Gas Service in San Francisco

By W. R. MORGAN, Superintendent Gas Distribution, San Francisco District.

W. R. Morgan

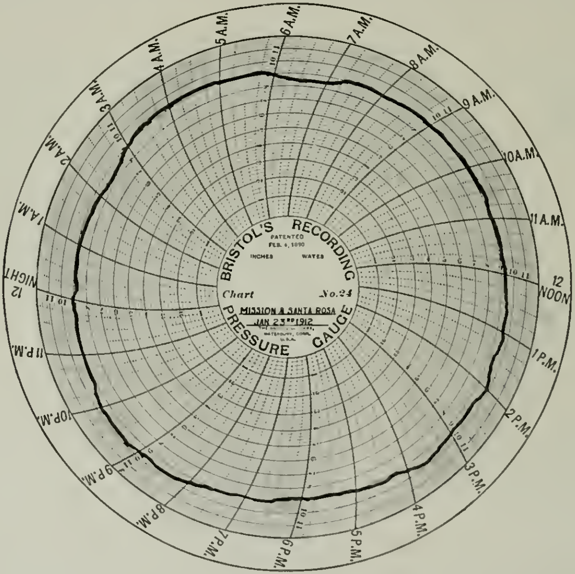
Recently several new districts in San Francisco have been added to those enjoying the benefit of "Pacific Service."

In the extreme southerly part of the city, gas mains have been extended to supply Sunnyside, Excelsior Homestead, Mission Terrace, West End Homestead and Ocean View.

During the past few years, these districts have gone ahead by leaps and bounds. The old time vegetable gardens have been transformed into flower gardens; picturesque windmills have made way for shade trees, and uninteresting cabbage-patches have been cut up into attractive home sites.

The barren hillsides and sandy plains of yesterday are now covered by thriving centers of population, with schools, stores, good pavements and all the other advantages of vigorous urban development.

The improvements made by the Pacific Gas and Electric Company include some twenty-five miles of street mains, supplied by five miles of high pressure feeders. The feed mains extend from Railroad Avenue and from Mission Street to seven district governors built at convenient centers from which the service mains radiate.



A twenty-four hour pressure chart shown herewith will serve to illustrate the unvarying gas pressure maintained at consumer's meters. This particular chart was taken at Mission Street and Santa Rosa Avenue, a location about midway between Excelsior Homestead and Mission Terrace.

Authorized Additions and Improvements

DE SABLA POWER DIVISION

Work has been commenced on the reconstruction of the 60-kilovolt line between De Sabla and Centerville.

FRESNO DISTRICT

A 16-inch suction line will be installed from the relief holder to exhauster to improve conditions.

MARIN DISTRICT

Extension of three-phase 11-kilovolt line has been made from Alta to supply to Remillard Brick Company.

STOCKTON POWER DIVISION

Construction of eight miles of 11-kilovolt line has been commenced, to take care of additional pumping service in this District.

SACRAMENTO DISTRICT

Twenty-five new series street arc lamps have been ordered installed.

COLUSA DISTRICT

Extension has been made to Bogg's Ranch for purpose of installing a 15-horsepower motor as a demonstrating plant.

WOODLAND DISTRICT

Extension of 11-kilovolt line from Knights Landing-Woodland Line to Yolo Orchard has been made for improvement of service.

OAKLAND DISTRICT

Work has been commenced at the gas works upon construction of concrete salt water sump, and the installation of two lines 30-inch cast-iron pipe from sump to seawall on low tide level.

REDWOOD DISTRICT

Extension has been made of the three-phase 11-kilovolt line to the Reed Zinc Works at Ravenswood to take care of that company's requirements.

SOLANO DISTRICT

Arrangements are being made to place all flat-rate consumers at Davis upon a meter basis.

STOCKTON POWER DIVISION

Construction of 5½ miles 11-kilovolt line to the pumping plant of the River View Land Company has been commenced, to take care of that company's load.

MARYSVILLE POWER DIVISION

Eleven-kilovolt line has been extended 5½ miles in order to give service to the Richvale Land and Water Company.

FRESNO DISTRICT

Work will shortly be commenced on the erection of a fireproof warehouse at this point.

SAN FRANCISCO DISTRICT

A business buggy top automobile has been purchased for use in the Gas Service and Meter Department.

Arrangements are being made for the renewal of plates in storage battery, and for general repairs to tanks at Station "C."

A Flanders No. 20 automobile has been purchased for the Records Department; and also four additional automobiles for the use of the Gas Service and Meter Departments.

OAKLAND POWER DIVISION

Arrangements are being made for the installation of wattmeters in all substations in order to integrate kilo-watt-hours taken by each kind of service.

NAPA DISTRICT

Arrangements are being made for placing all flat-rate consumers upon a meter basis in this District.

SAN FRANCISCO

A new six-cylinder Locomobile has been purchased for the use of the Second Vice-President and Treasurer's Department.

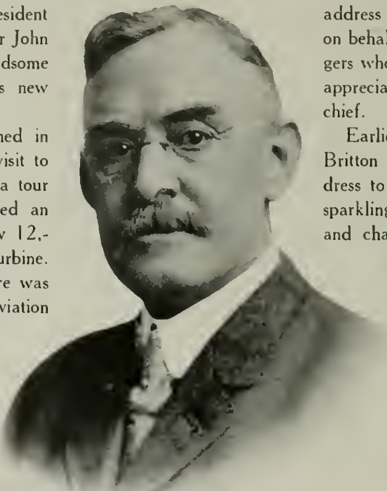
SOLANO POWER DIVISION

Construction of 3.7 miles 11-kilovolt line has been commenced in order to furnish service to the pumping plants of the Sacramento Valley Sugar Company.

Mr. Britton was Taken by Surprise

Vice-President and General Manager Presented With a Set of Silver for His New Country Home

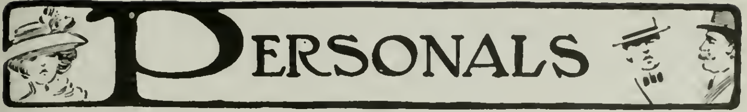
The Pacific Gas and Electric Company's Department and District Managers held a reunion in Oakland on Saturday, February 24th last, and an almost dramatic feature of the occasion was the presentation to Vice-President and General Manager John A. Britton, of a handsome set of silver for his new home at San Mateo.



The reunion opened in the morning with a visit to Station "C", where a tour of the works included an inspection of the new 12,000-kilowatt steam turbine. In the afternoon there was an excursion to the aviation meet at Emeryville under the leadership of Frank A. Leach, Jr., the genial Oakland District Manager, and in the evening the jinks-room of the Nile Club was the scene of activities. There the turbine was again the subject of discussion, and Engineer Frank H. Varney read an interesting paper which was illustrated by stereopticon views, R. J. Cantrell operator. The paper was followed up by a general discussion upon the principle of the turbine, during which Mr. Varney subjected himself to some close questioning, particularly upon the general efficiency of the turbine as compared with that of the reciprocating engine.

It was a most pleasant as well as instructive discussion and was thoroughly enjoyed by all present. But a veritable climax was reached when Frank Leach called Mr. Britton to the stage and in a neat address made the presentation on behalf of the District Managers who had thus testified their appreciation and love for their chief.

Earlier in the evening Mr. Britton had made a clever address to his District Managers, sparkling with pleasant humor and charged with messages of confidence to all; but at that time, of course, he had no idea what they had in store for him by way of a reply. So when the surprise came he was completely nonplused. He tried hard to "come back." He looked up at the ceiling and after a long pause essayed to say something; but it was of no use, and with a wave of the hand he gave up the attempt. Afterward, when he stood by the door and shook hands with the boys, one and all, his eyes were dimmed with tears. The incident will be remembered by all who were present, and, needless to say, nothing among Mr. Britton's possessions in his new country home will be prized more highly than this set of silver, every piece of which bears the stamp of affection and regard.



PERSONALS

Mr. John Martin returned last month from a ten-weeks' sojourn in the East and is once more domiciled in his beautiful country home at Ross Valley. He passed most of his time in New York City and was there when the $20,000,000 bond deal between the Pacific Gas and Electric Company and the financial house of J. Pierpont Morgan was put through.

Mr. Martin regards that transaction of the greatest importance, not only to the Company but also to public service enterprise in general.

"It has had the effect of bringing our institution into established prominence in the financial centers of the world, so that its securities are now held in England, France and Germany, as well as all over the United States," states Mr. Martin. "Moreover, the general investing public in New York and elsewhere is now looking with more and more favor upon public utilities for investment. The situation is encouraging to a degree, for it shows that the old distrust of public-service corporations is passing out of the public mind. Good management and square, open dealing have won their way, and the demand for securities of this kind is growing daily."

The hand of congratulation is extended to Henry Bosch, Jr., Assistant Engineer of Electrical Construction, who has taken a leap-year leap into matrimony.

On the day of all days, February 29th, he espoused Mrs. Edna A. Beaver, who for some time occupied the position of stenographer in the University of California. His friends in the service of the Pacific Gas and Electric Company clubbed together for a handsome set of glassware to start him in housekeeping.

And now the question arises how are Mr. and Mrs. Henry Bosch, Jr. going to celebrate their wooden, tin, silver and, let us hope, golden weddings on the proper anniversaries?

The foregoing was not Dan Cupid's only invasion of the Engineering Department since the last issue of the Pacific Gas and Electric Magazine. E. M. Whipple, hydrographer, took the plunge on Sunday, March 10th, the other party to the venture being Mrs. Louise Scott of Berkeley. He tried hard to keep the matter quiet, but the boys got wind of it and their congratulations and good wishes took the form of a silver fruit dish.

From the Oakland District comes notice of an event that in the time to come may give a recruit to the ranks of the Company's employes. On February 21st, there arrived a little son to gladden the household of R. O. Adams of the Commercial Department across the bay.

On the 20th of the current month the Directors of the Pacific Gas and Electric Company issued and sold $3,000,000 par value of the common stock of the corporation to a syndicate of local bankers.

An offer will shortly be made to all of the present holders of common stock, under which they may secure allotments of this new issue to the extent of 10 per cent of their holdings at the price of $60 per share, payable in installments.

The proceeds of this new sale of stock will be used by the Company for new construction and other capital requirements.

Pacific Gas and Electric Magazine

PUBLISHED IN THE INTEREST OF ALL THE EMPLOYEES OF THE PACIFIC GAS AND ELECTRIC COMPANY

JOHN A. BRITTON - - - - EDITOR-IN-CHIEF
FREDERICK S. MYRTLE - - MANAGING EDITOR
A. F. HOCKENBEAMER - - BUSINESS MANAGER

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The Pacific Gas and Electric Company desires to serve its patrons in the best possible manner. Any consumer not satisfied with his service will confer a favor upon the management by taking the matter up with the district office.

VOL. III MARCH, 1912 No. 10

EDITORIAL

TWO EVENTS OF UNUSUAL INTEREST to public service enterprise in California occurred during the month of March now drawing to a close.

On the 15th the Directors of the Pacific Gas and Electric Company officially declared the first of what it is hoped and expected will be an uninterrupted series of quarterly dividends upon the common stock of the corporation. On the 15th of April every person of record as a stockholder on the day the dividend was declared will receive a check for an amount of money at the rate of $1.25 for every share standing in his or her name. This means of course, that from now on Pacific Gas and Electric common pays interest at the rate of 5 per cent per annum on the par value of the stock.

This is good news indeed. It is hailed far and wide as a truly important event in financial circles. To quote a leading San Francisco journal: "More than a year ago it became apparent that some such policy was the logical outcome of the general plan of development outlined by the Pacific Gas and Electric Company." But it means more than the mere payment of a profit upon investment. It means that public service enterprise in California is enjoying the confidence of the people. It means, too, that honest and business-like administration will obtain substantial results however much its efforts may be hampered from time to time by obstacles foreseen and unforeseen.

The other matter of general interest is the Public Utilities Law passed by the California State Legislature during the extra session in December, and which went into operation on March 23rd. Every well-conducted public service corporation should hail this new law with acclaim and play its part in insuring its successful operation. The public service situation is recognized not only in California but all over the Union, and the common sentiment is in favor of just such a law as may in time give a state-wide scope to the system of regulation which is thereby placed in the hands of a state commission. Upon this subject of commission control is heard a voice from the southland. In the current number of "Public Service" appears the following from the pen of Mr. R. H. Ballard, Secretary of the Southern California Edison Company:

"It is a common belief that the methods of public service corporations are secretive and that it is their desire to withhold from the public all information pertaining to operation, submitting only such data as may be required by law. It is unfortunate that such belief exists, as I am confident that the modern public service corporation anxiously awaits the time when it may lay all of its affairs before the public with the assurance that such conclusions as are reached regarding its business will be based on all the facts rather than on a possible distortion of one or two items for political purposes. This condition will doubtless be brought about in time through careful and conscientious regulations of the affairs of corporations, including not only the regulation of rates of charge, but service conditions, extensions to plants and properties and the issuance of stocks and bonds.

"A long step in this direction has been taken in the passage of legislation placing the affairs of public service corporations under the jurisdiction of the Railroad Commission of California. Unfortunately, however, the authority given this commission does not extend to a full regulation of the business of these corporations, and we may, temporarily, at least, be forced to meet a condition where the Railroad Commission will be regulating the issuance of stocks and bonds and ordering expenditures by the corporation for extensions and improvements, while municipal bodies are fixing the rates to be charged for service. There is a chance that this dual regulation may be inconsistent.

"Many benefits will accrue to public service corporations through proper regulation, not the least of which will be the absolute stability of their securities and protection from unnecessary competition.

The Public Utilities Commission for California has already discussed preliminaries and proposes to lose no time in entering upon its regular duties. The outcome will be watched with general interest. So far as the Pacific Gas and Electric Company is concerned, it welcomes investigation and regulation by a properly constituted and competent authority, and feels confident that the result will be the establishment of the best possible relations between the public utilities and the people they serve.

Collectors Discuss Their Work

On Saturday evening, January 27th, the members of the Collection Department met at dinner and held a business meeting afterward to discuss the work in the Department. The attendance numbered seventy-six.

Some two weeks previous to the meeting the Collectors had been requested to make written suggestions regarding possible improvements in the work of the Department and changes which would facilitate the work. These suggestions had been carefully investigated and a full discussion was given at the meeting. From these suggestions and the discussions thereon, many favorable hints were noted which from time to time may be introduced in the system as the Management finds it advisable.

Shortly after assembling, Mr. G. C. Holberton, Manager of the San Francisco District, dropped in and spent some twenty minutes making a short address on the work of the Collection Department and its relations to the Public. During the dinner musical selections were rendered by Messrs. Meyer and Pierard, and an original poem was read by Mr. R. Morison.

Altogether, the meeting was productive of increased enthusiasm and a spirit of good fellowship and hopes for subsequent meetings to be held.

Manager F. F. Barbour, of the Collection Department, was the recipient of a beautiful basket of carnations presented to him by the Collectors.

Merchants are Appreciative

In connection with the new steam station at Sacramento, now in process of construction, the announcement that home industry will be favored in the purchase of all available material and supplies has met with general satisfaction. The following communication from the merchants of the Capital City speaks for itself:

Mr. John A. Britton,
Vice-Pres. and General Manager,
Pacific Gas and Electric Company.

Dear Sir:—It having come to the notice of the Executive Board of the Sacramento Retail Merchants' Association that you have directed your assistant to give the preference to local manufacturers and dealers in the matter of supplies for your new steam plant, everything being equal, I am directed by that body to return to you their sincere thanks on the part of the merchants and manufacturers of Sacramento, and to assure you that your decision is highly appreciated by them.

Very respectfully yours,
E. C. RUTHERFORD,
Secretary.

What the Press Has to Say

An Important Financial Event

Pacific Gas and Electric Company Declares its First Cash Dividend on the Common stock

By far the most important event in local financial circles in many a day was the decision yesterday of the directors of the Pacific Gas and Electric Company to place the common stock upon a dividend-paying basis. A resolution was adopted, announcing the intention of the Board to declare a dividend March 15. It will be at the rate of 1¼ per cent a quarter, or 5 per cent a year. The first payment will be made April 15. There are 300,000 shares of common and the annual disbursement will amount, therefore, to $1,500,000. This, of course, will be in addition to the usual 6 per cent on the preferred.

More than a year ago it became apparent that some such policy was the logical outcome of the general plan of development outlined by the Pacific Gas and Electric Company. A dividend on the common was predicted in these columns at that time. The most recent indication came in the form of a stock dividend, and yesterday came the official action on cash dividends.

There was some discussion as to the size of the disbursement. At first it was intended that it should be upon a basis of 4 per cent. Certain interests contended for 6 per cent, and eventually a compromise was reached at 5 per cent.

Since the formation of the company the common has not participated in the earnings. Vast sums have been expended in betterments and improvements. It was only after the financing for the immediate future had been completed with a sale of $20,000,000 in bonds to J. P. Morgan & Co. that the directors felt warranted in allowing the common stock to partake of the profits.

The stock has been active on the local exchange, rising steadily upon the general rumors that dividends were imminent. After the issue had touched 60 and no announcement had been made as to dividends, a bear interest was organized, but it had scarcely begun to operate before the heavy buying here and for eastern account carried the stock to new levels and swept the bear interest out of the market. The stock sold up to 62¼ yesterday and at that figure will yield 8 per cent on the investment.

San Francisco (Cal.) *Call*, March 6, 1912.

Set all Speculation at Rest

The directors of the Pacific Gas and Electric Company yesterday set at rest all speculation as to the company's attitude toward dividends by deciding to meet on the 15th of the present month for the purpose of declaring a dividend on the common stock of the corporation.

In pursuance of the directors' action yesterday, the company will declare a dividend of $1.25 a share on the outstanding common stock, aproximately $30,000,000, and will, it is announced, regard this as a quarterly dividend, to be followed by a succeeding dividend each succeeding quarter. This would put the stock of the company on a 5 per cent basis.

It is announced that the dividend to be declared on the 15th will be made payable in cash by check on April 15th, and will be paid to all stockholders of record on March 15.

For several weeks there has been a flurry in Pacific Gas and Electric common, due to the rumor that a dividend was to be declared, and the stock has fluctuated between 57 and 62. The present price is quoted at about 62. The promised dividend will be the first paid since the corporation's organization in 1905.

San Francisco (Cal.) *Chronicle*, March 6, 1912.

Benicia Now Up-to-Date

The Pacific Gas and Electric Company has just completed one of the best and most up-to-date lighting systems for Benicia that can be found in any city of its size in the State. New material and supplies for the service replaces that which had become obselete from long usage. New wires for the business and residence districts, new three-wire transformers, new poles, and, in fact, everything in connection with the system is the best obtainable.

To give some idea of the magnitude and expense of the installation, it is known that over a dozen men have been steadily engaged here for the past three months, and that the cost of the system to the company will aggregate $10,000.

Through the personal efforts of Don C. Ray, of Martinez, the manager of the Benicia-Contra Costa district, and the superintendents in charge, the installation work was expediently handled. The construction work was under the supervision of J. C. Blyde, of Napa, with H. Gully as foreman.

Instead of seventeen arc lights as formerly which gave service until 1 o'clock a. m., the city now has ninety-four 60-watt incandescent lamps distributed on First Street and about town where they give the best possible all-night service.

Many favorable comments are heard on all sides from our residents and the visitors to our city regarding our well-lighted town and the excellent service.

Benicia (Cal.) *Herald*, March 8, 1912.

Improvements at Vallejo

The contract between the Pacific Gas and Electric Company and the Rulfsun Metal Company, a San Francisco firm, was recorded in the office of County Recorder T. V. Corcoran, at Fairfield yesterday. The contract calls for the erection of a corrugated iron building at a cost of $1850, to be completed in thirty days.

This is only a small part of the work to be done, as the company is to spend $7000 on the improvement of its local branch. This money will be put in a steel building to cover the gas generators, and will replace the old brick structure.

Vallejo (Cal.) *Times*, Feb. 20, 1912.

Manager Young Complimented

An interesting and very illuminating article on "Gold Dredging in California" appeared in the January issue of the Pacific Gas and Electric Magazine. The history, growth and profitableness of this industry of which little is heard but which is one of the greatest in this State at the present time, comes from the pen of C. E. Young, the superintendent of the Marysville Power Division of the Pacific Gas and Electric Company, and gives a splendid view of the enormity and wealth of this work.

Martinez (Cal.) *Gazette*, Feb. 7, 1912.

Completing Line From Antioch

P. M. Downing, chief operating and maintenance engineer, T. H. Burnett, superintendent of the South Tower division, and several other higher-ups of the Pacific Gas and Electric Company, were through this section Wednesday on a tour of inspection.

The company has been receiving large supplies of construction material at this point during the past few days, to be used in the completion of the line from Antioch.

When perfected there will be little danger here from accidents cutting off electric current for any length of time, for should anything go wrong at the South Tower power station, from which the current is now furnished, it will be only the work of a few moments for the current from Antioch to be turned on.

Martinez (Cal.) *Gazette*, Feb. 28, 1912.

Activities Down Fresno Way

Company Installs New Laboratory and Employes Organize a Club

The Pacific Gas and Electric Company is installing a laboratory at its plant in the western part of Fresno for the purpose of testing all its gas in future.

The laboratory will cost about $1,500, and will be ready for use in a few weeks. Heretofore Manager W. M. Henderson has been compelled to send samples of the gas manufactured at the local plant to the San Francisco laboratory for analysis and comparison with the gas manufactured in other cities. These samples of gas were submitted in air-tight vessels.

Another innovation that the Pacific Gas and Electric Company is introducing in Fresno is a school of instruction for its employees.

The school is in the nature of a club, which at present numbers about forty men, all employees of the company, some working in the offices and others outside in trenches and other places as well as at the west side plant.

When the club meets, however, all are on terms of equality. Manager Henderson himself being a "private." The president of the club is James Beveridge, one of the bright young men who stands behind the counter at the J Street offices of the company and argues so eloquently and pleasantly with you when you think that you have been overcharged.

The object of the club as stated, is to increase the knowledge of the gas company's employees as to their work, and to allow them to become better acquainted with each other.

Fresno (Cal.) *Herald*, March 1, 1912.

Light for Castro Valley

The Pacific Gas and Electric Company are signing up the resident property owners of Castro Valley for light and power. They are extending their present system along Castro Valley Road from the foothill boulevard to the Lake Chabot. They expect to have their electric poles installed in this district within the next thirty days. This will give a city torch to the Castro Valley district.

San Leandro (Cal.) *Reporter*. Feb. 17, 1912.

Reconstruction Work in Napa

The Pacific Gas and Electric Company is on the point of completing the great task of the re-construction of its lines in the business section of Napa.

Last October the plan of removing the overhead distribution system from Main and Brown streets was approved by the Company, and the sum of $10,000 was appropriated with which to meet the cost of the undertaking. Material was immediately ordered, and upon its arrival early in November two crews of men were put to work.

Today the result is notable. Starting from the substation and continuing out First Street to Seminary Street, with branches on Coombs, Pearl and Second Streets, a new pole line of standard construction has been built. All the poles and crossarms are painted a uniform color and the effect is most pleasing to the eye.

On Main and Brown Streets the removal of the unsightly overhead wires has greatly added to the beauty of the city. The consumers on those streets are now supplied with power through iron conduits running along the front of the buildings. The conduits are installed according to the specifications of the Board of Fire Underwriters and will successfully operate under any emergency which might arise.

The benefits of the new system will not be in appearance alone, as separate circuits have been provided for the residence and business sections of the town, thereby improving voltage conditions.

In the near future an additional amount of $20,000 will be expended by the Company in re-building their lines in the residence section of Napa in order to improve the service.

Napa (Cal.) *Register*. Feb. 3, 1912.

Gas Mains for Hayward

HAYWARD, Feb. 24.—Gas mains are to be laid in every direction in the outlying districts of Hayward by the Pacific Gas and Electric Company for use by poultry raisers in their incubators and brooding pens. Representatives of the corporation were here yesterday making an inspection of local conditions. The company intends installing a system like the one at Petaluma, where more than six thousand connections are in use on poultry ranches. The growing proportions of the Hayward poultry industry is such that the company feels justified in making the necessary outlay.

Oakland (Cal.) *Tribune*, Feb. 24, 1912.

Farmers Will Have Light

Pacific Gas and Electric System Spreads Cheer and Comfort through the Country

DAVIS (Yolo Co.), Feb. 21.—The Pacific Gas and Electric Company has a large number of men at work connecting up the Tremont country so that the farmers southeast of Davis will soon have electric light in their homes. The company has also about completed its renovations at the power house, and will soon install a complete new system for the town. Another new departure is the installation of a motor generator to furnish the Southern Pacific with power for the block signals.

This will cost the Southern Pacific Company less than $200 a month, whereas it has been costing them close to $1,200. Then, too, this will be absolutely safe, for if any of the high-tension wires should fall short, the engineer could, in the fraction of a second, have the motor going, generating its own electricity. The Pacific Gas and Electric Company claim that this station is one of the most important on the line, and is sparing no expense in having it right in line with all the latest and best. The block signals will be supplied as far as the Oregon line on the north and as far as the Sierras on the east with current from the Pacific Gas and Electric Company.

Sacramento (Cal.) *Union*, Feb. 22, 1912.

Taking Care of Petaluma

The new gas holder on Second Street is nearing completion. Manager Weber of the Pacific Gas and Electric Company stated today that he expects to have it in operation within two weeks. The painters are nearly through with the painting, and as soon as that is finished there will remain only to apply the pressure in order to test its capacity. This holder will be a great thing for Petaluma, as it will hold gas enough (1,500,000 cubic feet) to insure even pressure all over the city for about two days, which is practically as good as would be the installation of a plant here.

The holder works on the same principle as the small machine used in the manufacture of acetlyene gas for individual house. The immense structure rises with the increasing pressure as the gas is pumped in, and falls as it is used out, thus the intense weight of material in the holder itself is always on the gas, driving it through the pipes and causing a uniform pressure at all times.

Manager Weber is very enthusiastic over the new acquisition and eagerly awaits, together with all of the gas consumers of Petaluma, for the time when the big pumps may be set to work filling the new holder.

Petaluma (Cal.) *Courier*, Feb. 27, 1912.

Electric Truck Arrives

The Pacific Gas and Electric Company today received, over the Northern Electric railroad, an automobile truck to be used by the foreman of the line work. The truck is the largest 1912 model, and will be of much assistance to the line-repairing crew.

Marysville (Cal.) *Appeal*, Feb. 23, 1912.

Domestic Science Lessons

By MRS. H. ROSE STEWART.

LESSON VIII—CANNING AND PRESERVING.

CANNING

The important points to be observed in canning are, to use only sound, ripe fruit; to have hot syrup and air-tight jars; to fill jars to overflowing and seal immediately. Jars should be scalded and tested before using. Patent canners greatly simplify the work.

Pick over the fruit, stem, pare, cut, wash, etc., and pack in jars. Make syrup by adding one-half pint boiling water to one pound sugar. When clear, bring to boiling point and carefully fill the jars. Stand in canner or on board in wash-boiler containing water up to shoulders of jars. Cover and cook according to directions or till tender. Take from canner or boiler, add more syrup till overflowing, cover and seal immediately.

AMOUNT OF SUGAR PER QUART JAR.

	CANNED	PRESERVED
Cherries	4 oz.	8 oz.
Strawberries	8 oz.	12 oz.
Raspberries	4 oz.	6 oz.
Blackberries	6 oz.	9 oz.
Quinces	8 oz.	12 oz.
Pears	4 oz.	8 oz.
Grapes	4 oz.	8 oz.
Peaches	4 oz.	8 oz.
Pineapples	8 oz.	12 oz.
Crab-apples	6 oz.	10 oz.
Plums	6 oz.	9 oz.
Rhubarb	8 oz.	12 oz.
Sour apples	6 oz.	9 oz.
Currants	8 oz.	12 oz.
Cranberries	8 oz	12 oz.

PRESERVING

Preserves require from three-quarters to one pound of sugar to each pound of fruit, and one-half cup water to each pound sugar. The fruit should be simmered in the syrup until tender a little at a time; skimmed out into the jars; when all are done the syrup should be brought to boiling point, jars filled and sealed. Hard fruits like quinces should be first steamed or cooked in boiling water till tender.

JAMS

Jams are usually made with small fruits or with chopped large fruits; they are cooked with an equal weight of sugar till rich and thick, then put into tumblers or small jar and sealed.

JELLIES

Use equal parts of sugar and drained fruit juice. Mash and heat berries till juice runs readily, then turn into bags of unbleached muslin or two thickneses of cheese-cloth and let drip. Measure juice and sugar. Boil juice twenty minutes. Have sugar in shallow pan, heat through in open oven. Add to boiling juice, boil up once, take off fire and pour into tumblers. Fruit like apples and quinces should be chopped and covered with water, then simmered till tender before turning into jelly-bags.

PICKLES, ETC.

Use glass bottles for pickles, also wooden knives and forks in preparation of them. Fill bottles three parts full with articles to be pickled, then fill bottle with vinegar. Use saucepans lined with earthenware, or stone pipkins, to boil vinegar in.

CHOW CHOW

1 quart large cucumbers
1 quart small cucumbers
2 quarts onions
4 heads cauliflower
6 green peppers
1 quart green tomatoes
1 gallon vinegar
1 pound mustard
2 cups sugar
2 cups flour
1 ounce turmeric

Put all in salt and water on night; cook all the vegetables in brine until tender, except large cucumbers. Pour over vinegar and spices.

PICKLING CAULIFLOWERS

Take whitest and closest cauliflowers in bunches; spread on earthen dish, cover them with salt, and let stand three days to draw out all the water. Then put in jars, pour boiling salt and water over them, let stand overnight; then drain with a hair-sieve and put in glass jars; fill up jars with vinegar; cover tight.

PICCALILLY

1 peck green tomatoes, sliced
½ peck onions, sliced
1 cauliflower
1 peck small cucumbers

Leave in salt and water twenty-four hours; then put in kettle with:

1 handful scraped horseradish
1 ounce turmeric
1 ounce cloves (whole)
¼ pound pepper (whole)
1 ounce cassia-buds or cinnamon
1 pound white mustard seed
1 pound English mustard

Place in kettle in layers, and cover with cold vinegar. Boil fifteen minutes, constantly stirring.

PICKLED RED CABBAGE

Slice it into a colander, sprinkle each layer with salt; let it drain two days, then put into a jar, pour boiling vinegar enough to cover put in a few slices of beet-root. Choose purple red cabbage. Those who like flavor of spice will boil it with the vinegar. Cauliflower cut in bunches and thrown in after being salted, will look red and beautiful.

TOMATO CATSUP

1 gallon tomatoes (strained)
6 tablespoons salt
3 tablespoons black pepper
1 tablespoon cloves
2 tablespoons cinnamon
2 tablespoons allspice
1½ pints vinegar

Boil down one-half hour. One peck tomatoes will make one gallon strained.

WALNUT CATSUP

Take green walnuts before the shell is formed (usually in a proper state early in August.) Grind them or pound them in an earthen or marble mortar. Squeeze out the juice through a coarse cloth, and add to every gallon of juice:

1 pound anchovies
1 pound salt
4 ounces cayenne pepper
2 ounces black pepper
1 ounce each ginger cloves, and mace, and the root of one horseradish

Boil all together till reduced to half the quantity. Pour off, and when cold, bottle tight. Use in three months.

SPICED FRUITS

For this recipe one may use peaches, pears, or crab-apples. Put into a preserving kettle four pounds of granulated sugar, a quart vinegar, two sticks of cinnamon and two tablespoons of cloves. (For pears or crab-apples tie the cloves into a small bag.) When spicing peaches, stick four cloves into each peach. Boil sugar, spices, and vinegar together for fifteen minutes, and add seven pounds of fruit. Peaches should be peeled and left whole; pears, peeled and cut into halves, but not cored; crab-apples washed and left whole with their stems on. Simmer the fruit until tender, but be careful not to let it get very soft, as it will continue to cook in the hot syrup after the kettle is taken from the range, and may fall to pieces. The fruit should be removed from the syrup as soon as it is tender enough to pierce easily with a straw. Fill jars with the fruit. Boil the syrup until it is thick, then fill jars to overflowing with it. Wipe the jars and put on rubbers and tops while very hot.

HOMEMADE CANDIES

FONDANT

6 cups of granulated sugar
2 cups of water
¼ teaspoonful of cream tartar

This is a cream filling for all kinds of nuts and conserves, chocolates, etc. It is very simple and is capable of such variety in its use with other additions that it is a great resource to the amateur confectioner. The recipe given here is a convenient quantity for home use. A marble slab at least two feet is desirable. A larger quantity of syrup would be likely to run off the slab, and become unmanageable. Cook the syrup, sugar, water and cream tartar until it will cream, the test being made by rubbing about two teaspoonfuls in a smooth-bottom saucer with a teaspoon. It ought to form a stiff mass. The syrup will be quite liquid, and you must have it poured out gently on the slab while you work it back and forth with a wooden butter-paddle until cool enough to use the hands instead; work it rapidly until it is like bread dough and will come off the board clean. If you find that it is too thick and adhering to the board too fast for you to work it, add a little hot water, and let an assistant scrape it up off the board with a broad knife. If it will not cream, put it back on the fire and cook a little more. A little experimenting will soon bring good results.

Divide the mass into pieces, and color and flavor to taste, it is then ready to use.

The receipts for making a fondant with sugar, white of eggs and water, which becomes hard as soon as the water dries out, and has never the flavor of the cooked cream, is not given here, as this receipe is far superior. No one having made the cooked cream will again use the other. In all places where the word "Fondant" is used this cream will be meant, and it is presumed that you have it at hand.

CREAM WALNUTS

Crack the walnuts so as to leave the nuts whole; flavor the fondant with Vanilla or Rose Extract and divide the mass and color with Rose Paste. Mold into little balls and press a half nut on each side. They will stiffen in a few minutes.

CHOCOLATE FUDGE

Mix four cupfuls of brown sugar with three-quarters of a cupful of rich milk, add three tablespoonfuls of butter and three ounces of unsweetened chocolate. Stir until it reaches the soft ball when tried in cold water or 240 degrees Fahrenheit by the thermometer. Take from the fire, add two teaspoonfuls of vanilla extract, beat till rather stiff, then add two cupfuls of chopped English walnut meats, and pour into a well buttered shallow pan. When nearly cold mark into neat squares. One cupful of finely chopped figs may be substituted for the nut meats if desired.

BUTTER SCOTCH

2 cups sugar
2 tablespoons water
Piece butter size of an egg

Boil without stirring until it hardens on a spoon. Pour out on buttered plates to cool.

CREAM CANDY

1 lb. white sugar
3 tablespoons vinegar
1 teaspoon extract lemon
1 teaspoon cream tartar

Add little water to moisten sugar, boil until brittle. Put in extract then turn quickly out on buttered plates. When cool, pull until white and cut in squares.

CREAM WALNUTS

2 cups sugar
⅔ cup water

Boil without stirring until it will spin a thread; flavor with extract vanilla. Set off into dish with cold water in; when at blood heat stir briskly until white and creamy; then knead and work with the hands for several minutes. Have walnuts shelled; make cream into small round cakes with your fingers; press half a walnut on either side, and drop into sifted granulated sugar. For cream dates, take fresh dates, remove stones, and fill center of dates with this same cream. Drop into sugar.

CREAMED NUTS

Mix 1 lb. confectioner's sugar, white 1 unbeaten egg, 1 teaspoon vanilla, and 2 teaspoons cold water to a stiff paste. Shape in little balls, press between halved walnut or other nut meats. Stoned dates and large raisins may be filled with this cream, or it may be mixed with chopped nuts, shaped in bars, and cut in squares.

BUTTER TAFFY

Boil 3 cups brown sugar, ½ cup molasses, ¼ cup each hot water and vinegar. When it crisps in cold water, add 2 tablespoons butter, 1 teaspoon vanilla, cook 3 minutes, cool on buttered pans.

HICKORY NUT CANDY

1 cup hickory nuts (meats)
2 cups sugar
½ cup water

Boil sugar and water, without stirring, until thick enough to spin a thread; flavor with extract lemon or vanilla. Set off into cold water; stir quickly until white; then stir in nuts; turn into flat tin; when cold cut into small squares.

CANDIED POPCORN

Put into an iron kettle 1 tablespoon butter, 3 tablespoons water, 1 tea-cup white pulverized sugar. Boil until ready to candy, then throw in 3 quarts nicely popped corn. Stir briskly till candy is evenly distributed over corn. Take kettle from fire, stir until it is cooled a little and you have each grain separate and crystallized with sugar, taking care that corn does not burn. Nuts of any kind may be prepared in same way.

COCOANUT CREAM CANDY

1 cocoanut
1½ lbs. granulated sugar

Put sugar and milk of cocoanut together, heat slowly until sugar is melted; then boil 5 minutes; add cocoanut (finely grated) boil 10 minutes longer, stir constantly to keep from burning. Pour on buttered plates, cut in squares. Will take about two days to harden. Use prepared cocoanut when other cocoanut cannot be had.

CHOCOLATE CARAMELS

2 cups molasses
1 cup brown sugar
1 cup cream or milk
½ lb. chocolate
Piece of butter size of an egg.

Beat all together; boil until it thickens in water; turn into large flat tins, well buttered. When nearly cold, cut into small squares.

ICE CREAM CANDY

3 cups sugar, crushed or cut loaf
A little less than ½ cup vinegar
1½ cups cold water
Piece of butter size of a walnut.

Flavor with extract vanilla. Boil until it hardens, then pull until white.

MOLASSES CANDY

3 cups yellow coffee sugar
1 cup molasses
1 cup water
½ teaspoon cream of tartar
Butter size of a walnut.

Follow directions for cream candy.

VELVET MOLASSES CANDY

Put in agate kettle:

1½ lbs. sugar
½ pint molasses
½ pint water
¼ cup vinegar

Heat, when boiling add ½ teaspoon cream tartar, boil till it crisps in cold water. Stir; when almost done add ¼ lb. butter, ¼ teaspoon soda. Cool in buttered pan and pull.

PEANUT BRITTLE

Shell and chop roasted nuts to measure 1 pint. Put 2 lbs. granulated sugar in clean frying pan. Stir over slow fire. It will lump, then gradually melt. When pale coffee color and clear add nuts and pour quickly on buttered tin sheet. Roll thin as possible. When cold break up.

PACIFIC GAS AND ELECTRIC COMPANY

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CONTRA COSTA	Martinez	DON C. RAY	SO. SAN FRANCISCO	So. San Francisco	FRANK P. EDWARDS
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PACIFIC GAS AND ELECTRIC COMPANY

CITIES AND TOWNS SUPPLIED WITH GAS, ELECTRICITY, WATER AND RAILWAY

Service Furnished	Number of Towns	Total Population
Electricity	187	1,081,222
Gas	49	978,167
Water	10	45,825
Railway	1	60,000

Place	Population
Alta	20
[1] Alameda	25,000
[2] Albany	800
Amador City	200
Adams John	25
Alleghany	200
Alto	25
Angel Island	280
[3] Auburn	2,375
Agua Caliente	100
Alvarado	900
Antioch	3,000
[2] Barber	500
[2] Belmont	350
Ben Lomond	800
Belvedere	1,000
Benicia	3,360
[2] Beresford	25
[2] Berkeley	40,000
Biggs	750
Big Oak Flat	20
Brentwood	200
Broderick	200
Brown's Valley	50
Byron	200
[2] Burlingame	4,000
California City	25
Camp Meeker	200
Campbell	600
Centerville	1,000
Centerville	20
[2] Chico	13,000
[2] Colma	3,500
[2] Colusa	1,500
Concord	1,500
Cement	1,500
[5] Colfax	500
Cordelia	150
Corde Madero	350
Crockett	2,500
Crow's Landing	375
Cupertino	50
Daly City	250
Danville	250
Davis	750
Decoto	350
de Sabla	25
[5] Dixon	1,000
Dobbins	50
Davenport	1,000
Drytown	20
Durham	500
Dutch Flat	500
Duncan's Mills	150
[2] Easton	300
[3] East San Jose	1,660
Eagle's Nest	50
Edenvale	500
Eldridge	500
Elmira	150
El Verano	400
[2] Emeryville	5,000
Encinal	100
Fairfax	500
Fairfield	834
Forestville	100
Felton	300
[1] Fresno	30,000
[2] Fair Oaks	250
Folsom	1,800
Gilroy	2,000
Glen Ellen	500
Gold Run	100
[3] Grass Valley	4,500
Gridley	1,800
Groveland	125
Guerneville	500
Hammonton	500
[2] Hayward	4,000
[2] Hillsborough	1,000
Hollister	3,000
Hookston	75
Ignacio	100
Ione	900
Irvington	1,000
Jackson Gate	100
Jackson	2,035
Kennedy Flat	20
[2] Kentfield	250
Knight's Landing	350
Lake Francis	5
Lathrop	300
Live Oak	200
Livermore	2,250
Los Gatos	3,000
Larkspur	600
Lincoln	1,400
[2] Lomita Park	100
Los Altos	500
[5] Loomis	400
Martinez	5,000
Martell	150
[2] Marysville	7,000
Mayfield	1,500
[2] Menlo Park	1,500
Meridian	300
[2] Millbrae	300
Milpitas	300
Mill Valley	2,500
Mission San Jose	500
Mokelumne Hill	150
Monte Rio	50
Moulton's Landing	30
Mountain View	2,500
Mt. Eden	200
Mare Island	500
[2] Napa	7,000
[3] Nevada City	2,700
New Chicago	10
Newark	700
[5] Newcastle	750
Newman	1,000
Niles	800
Nicolaus	75
Novato	250
[2] Oakland	230,000
Oakley	80
[2] Palo Alto	6,300
Pacheco	200
Penryn	250
Patterson	300
Penn Grove	300
[2] Petaluma	5,500
[2] Piedmont	1,720
Pike City	200
Pinole	1,500
Pittsburg	2,372
Pleasanton	2,000
Point San Pedro	20
Port Costa	600
[2] Redwood City	3,200
[2] Richmond	10,000
Rio Vista	884
[5] Rocklin	1,000
[5] Roseville	2,600
Rodeo	500
[2] Ross	500
[4] Sacramento	60,000
San Andreas	200
[2] San Anselmo	1,500
[2] San Bruno	1,500
[2] San Carlos	100
[2] San Francisco	416,912
[2] San Jose	30,000
[2] San Leandro	4,000
San Lorenzo	100
[2] San Mateo	6,500
[2] San Quentin	2,500
[2] San Rafael	6,000
San Pablo	1,000
Santa Clara	6,000
Santa Cruz	16,000
Saratoga	50
[2] Santa Rosa	12,000
[2] Sebastopol	1,200
Sausalito	2,500
Smartsville	500
[2] South San Francisco	2,500
[2] Stanford University	2,600
Sonoma	1,200
Stege	1,000
[5] Stockton	30,000
Suisun	1,200
Sutter City	150
Sutter Creek	1,500
Sunnyvale	1,500
Tiburon	400
Tormey	20
Towle	100
Tracy	1,200
Vacaville	1,200
[2] Vallejo	15,000
Walnut Crek	350
Warm Springs	200
Watsonville	4,500
Wheatland	1,400
Winters	1,200
[2] Woodland	3,200
Yolo	400
[2] Yuba City	1,200
Total	1,136,222

Unmarked—Electricity only.
1—Gas only.
2—Gas and Electricity.
3—Gas, Electricity and Water.
4—Gas, Electricity and Street Railways.
5—Electricity and Water.

EMPLOYS 4,500 people.
OPERATES 11 hydro-electric plants in the mountains.
4 steam-driven electric plants in big cities.
17 gas works.

SERVES ⅔ of California's population.
30 of California's 56 counties.
An area of 37,950 square miles.
¾ the size of New York State.
½ the size of all the New England States combined.

ANNOUNCEMENT

WE beg to advise that, on and after March first, we will distribute our goods to the Pacific Coast trade through our own office, at 237 Powell Street San Francisco

All communications regarding Humphrey Gas Arc Lamps, Mantles, Glassware and Accessories should be sent to the Company at the above address.

March 1, 1912

C. B. BABCOCK
PACIFIC COAST REPRESENTATIVE
General Gas Light Co.
KALAMAZOO, MICH.
SAN FRANCISCO NEW YORK

PACIFIC GAS AND ELECTRIC MAGAZINE

PACIFIC COURTEOUS CONTINUOUS SERVICE

Published Monthly by
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO

VOL. 3 APRIL, 1912 NO. 11

LLOYD LAKE, GOLDEN GATE PARK

SAN FRANCISCO "1915" THE EXPOSITION CITY

ASSOCIATED OIL COMPANY

GENERAL OFFICE
Wells Fargo Building
San Francisco

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Two Motor generator exciter sets with 500 H. P. 2300 volt 115 ampere, 375 R. P. M. 3-phase, Induction Motors 340 K. W. 2720 amp. 125 volt full load, 125 volt no load.

One Stanley 100 H. P. 2080 volt 27 amp. 3-phase 500 R. P. M. Induction Motor with 2 16½ in. pulleys for 14 in. belt.

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Pacific Gas and Electric Magazine

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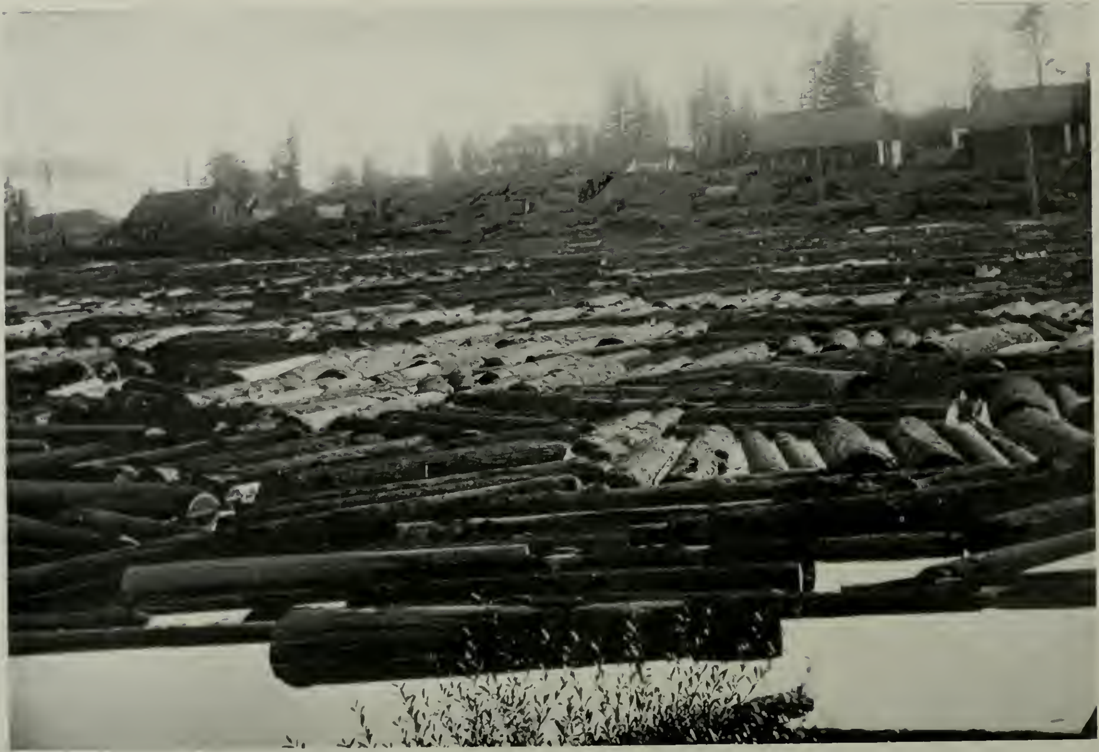


Looking out across the Log Pond at Sterling City. The illustration shows 15,000,000 of logs piled up, supposed to be the largest pile of pine logs ever known. (See Page 408.)

PACIFIC GAS AND ELECTRIC MAGAZINE

VOL. III APRIL, 1912 No. 11

Electricity to Protect Crops from Frost

By PROF. ALEXANDER G. McADIE, United States Weather Bureau, San Francisco.

ON DECEMBER 2, 1895, the Forecast Official at San Francisco sent warnings of impending frost to several points in the orange belt of southern California. The frosts came and there resulted serious injury to the crop. Much greater damage was done to the orange industry by the greed of certain packers who, regardless of consequences, shipped the frosted fruit to eastern markets.

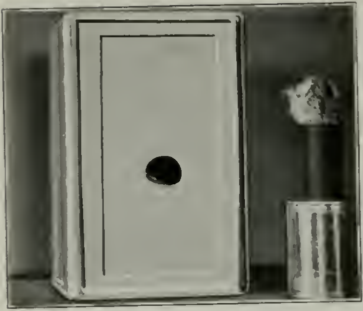
A few earnest orange growers in the vicinity of Riverside met and resolved to meet the issue squarely and devise means to protect the crop, if possible. After much discussion, in which the writer took part, experiments were begun and various types of heaters devised, the first to be put into actual operation being the coal-basket of Mr. Edward Copely.

From this modest beginning has grown a system of frost fighting now practiced in most states of the Union and spreading throughout the world.

In an address before the Western Fruit Jobbers Association the writer pointed out that last year California produced more gold than any other State; also that California produced nearly half of the total quantity of crude oil and, furthermore, that California produced a fruit crop worth not less than $50,000,000. Now the yield of gold and oil may increase or decrease during the coming years but the fruit crop is in large measure a product of human industry, subject to human control, and there is every likelihood of rapid increase in its value. And frost is a source of loss which is quick in action, is constantly recurring and totals a greater damage than either pest or drought.

In an effort to minimize this loss, the Weather Bureau for fifteen years past has studied the problem from two viewpoints, with most gratifying results. The first phase of the problem, naturally, is the giving of accurate warning; the second is to protect the fruit by controlling the temperature. There are a number of ways in which this last can be done, the simplest method being to add heat to the lower air during the frost period. This is done by burning fuel in various ways, in small fires, in coal baskets, in oil-pots or in orchard heaters. Within the last three years fifteen or sixteen types of orchard heaters, mostly oil burners, have been devised. These are in use now not only for the protection of citrus fruit but even in the mountain states for the protection of deciduous fruits against late spring frosts. The aggregate savings during the present spring will amount to many million dollars.

Competition between the makers of orchard heaters is keen and the industry is firmly



Frost-Fighting Vaporizer and Burner

established. But with the increasing use of oil burners has come objection to the amount of soot and the decreasing quantity of heat given off during the early morning hours when the heat is most needed, owing to the form of oil-pot. In order to meet these and other objections, the suggestion has been made that in certain communities electrical energy could be used advantageously in warding off frost.

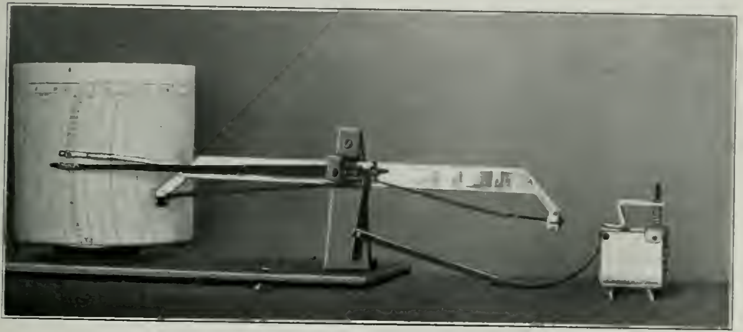
The writer believes that a large amount of heat is wasted and an unnecessarily large amount of soot produced. He has therefore devised a form of heater and vaporizer, wherein lighter oils are used, the combustion is more uniform, and the heat utilized to vaporize a large amount of water. The device consists of a small can holding about one quart of oil and provided with a candle or burner made of card-board and cotton waste. This is saturated with oil and readily lights when a match is applied. The outer receptacle is a can of about five gallons capacity—an old kerosene oil-can will do admirably for the purpose; into this is poured several gallons of water. The whole combination forms a unit and several units may be employed, one placed on top of the other, thus bringing the heated air and water vapor nearer the level of the fruit.

With this arrangement it is possible to evaporate ten pounds of water using one pound of oil. Beside the heat radiated to the air, we have the warmed vapor which, condensing about the level of the fruit, gives back the latent heat of condensation. Moreover, in the morning the water owing to its high specific heat is the best of all agencies for utilizing solar energy and thus preventing a too rapid warming of the chilled fruit after sunrise.

But why not use electricity? Obviously, in this form of heater the kerosene burner can be dispensed with and a small electric heater installed in its place. Such an arrangement need not be expensive, would be far more efficient than present devices, would require little attention and would keep warm the particular area needing protection without waste of heat. It would occupy less space than the other, as is shown by the illustration, and could be conveniently arranged at any desired height. It would be cleaner, safer and more easily controlled. The item for labor, hauling filling, lighting, refilling and extinguishing would be eliminated.

The City Electrician at Redlands has suggested to the writer that his plant might be made use of, and economically, during what

Electric Vaporizer compared in size with oil-burner is known as the grave yard shift, or from 11:30 p. m. until 5:30 a. m. Several possible ways of utilizing the energy offer themselves, first by direct heating, i. e., the use of resistance coils; second, by the use of fans or ventilators whereby the air could be kept in motion and the formation of stagnant pools of air prevented; third, by a combination of heating and vaporizing, wherein a certain amount of water is converted into vapor by an electrical heater properly installed.



Saturation Deficit Recorder

The whole subject is as yet in the pre-experimental period. While at first it may seem visionary, if one will stop to think of the problems successfully overcome by the transmission companies and the now rapidly increasing application of electricity to all forms of work and to all needs, including those of the household, and on both large and small scales, it does not seem altogether impracticable to attempt to use electricity in the orchard for the purpose named. It would have decided advantages in cleaninless, ease and quickness of control, and even in sightliness.

Certain objections may be made to present methods, for as it seems to the writer there is a tremendous waste of energy in heating up all-out-of-doors. Crude oil, to be sure, is cheap, especially when handled in bulk, but the gain in economy is offset by possible injury. The claim that the soot acts as a screen, preventing rapid thawing out at sunrise, may be true, but the same benefit can be obtained by the vaporizing device described above.

Dr. Robert Sibley, Editor of the Journal of Electricity, Mr. P. J. O'Gara, Plant Pathologist, at Medford, Oregon, and the writer, discussed the problem of crude oil, vs. electricity for frost protection in the Journal of Electricity, March 9 and March 16. The problem is a live one. On Christmas night, 1911, within the narrow strip of the San Gabriel valley (with electrical energy available in the orange orchards) a crop worth $40,000,000 was in jeopardy. To protect this crop, using crude oil, required an equipment of 150 2-gallon oil-pots to the acre. Incidentally, in one orchard (not in the valley) during thirteen nights of firing 45,000 gallons of distillate, 500 gallons engine distillate, 1,400 gallons crude oil and 125 tons of coal were burned. The total expense, including labor, for 225 acres of lemons was $4,726. These figures warrant thorough investigation of electrical means.

The Diamond Match Company's Plant in Butte County

By I. B. ADAMS, Superintendent, De Sabla Power Division.

I. B Adams

At Sterling City, in the northeastern portion of Butte County, is located the largest and best equipped saw-mill plant in California, the property of the Diamond Match Company. The main building is a three-story frame structure, located at the lower end of the log pond. The log pond is an artificial lake, covering an area of about fourteen acres and constructed to store and float saw-logs to the mill.

The first floor of the main building is used entirely for the main line shafting, counter shafting, pulleys, belts, transfer chains, and store rooms. The second floor houses the band saws, gang edgers, side edgers, cut-off saws, lath mills and planers. The third floor consists of repair shops, filing rooms, etc., and here the automatic saw-filing machinery is installed. There is an equipment of three automatic saw-filing machines and one machine for taking the tension out of the saws.

Diamond Match Company's Plant

A brick building on the north side of the main building houses the engine and boiler rooms. The plant was installed and placed in operation in 1904, but since that time additions and improvements have been instituted, and today the mill is the best equipped on the coast. Where it stands was once a dense forest, but the timber has been gradually cut away, and now the logging road extends twenty-five miles into the forest. Ten miles of this railroad is a broad-gauge road with a 4.6 per cent grade. From this point to the farthest camp, North Valley, fourteen miles farther on, the railroad is narrow-gauge with a 1 per cent grade. From the logging camps along the narrow-gauge road to the transfer point the logs are hauled by two Porter straight engines, the average load per train being sixteen cars, averaging 3,000 feet to the car. From the transfer point to the mill on the broad-gauge road Shay engines are used. They are very powerful, necessarily, for they are required to pull sixteen carloads of logs over the heavier grades to the mill. The average weight of the logs is seven pounds

Saw-Filing Room

to the board foot, or 316,000 pounds to the train load, weight of cars excepted.

In the woods the ox and horse teams of earlier days have been superseded by steam donkey engines. In fact, horses are now used only in grading the roads for the iron steed. At suitable places along the narrow-gauge road log chutes are run down the points, and along these chutes are located the yarding engines which pull the logs from the canyons and load them into the chute. The yarding engines are all 10″ x 12″ double cylinder, mounted on sleds, and are portable and pull themselves from one location to another whenever necessary. At the railroad end of these log chutes are located the large portable steam engines commonly known as "Roders," 11″ x 14″ double cylinder, which pull the logs up to the railroad. They pull from five to seven logs at a load from a distance upwards of one mile, and are equipped with two drums, with a large and small cable, the small cable being used to pull the main cable back for other loads. The main cables are steel, one inch in diameter.

View of Log Chute, Sterling Mill

The logs are unloaded from the cars directly into the mill pond, and then floated into the log chute. The chute extends ten feet under water and under and over it is run an endless chain to which hooks are attached. The logs are floated into the chute, the hooks sink into them, and they are drawn up into the mill. The chute is about one hundred feet long, and so while the log is traveling over this distance it is thoroughly washed. Ten streams of water from three-quarter inch nozzles with 110 pounds pressure per square inch strike the log at every angle and free it from dirt and pebbles which might injure the saws. The logs are then carried on to a platform about four feet above the level of the saw carriage, the platform accommodating about eight logs at a time. Two log turners, a Hill Nigger and a Simondson, are located below the platform and when a log is required on the saw-carriage the sawyer pulls a lever and in one second the log is turned and fastened to the carriage. The Simondson turner is equipped with arms and both lifts and turns the logs. It works to perfection and is the most fascinating piece of mechanism around the mill.

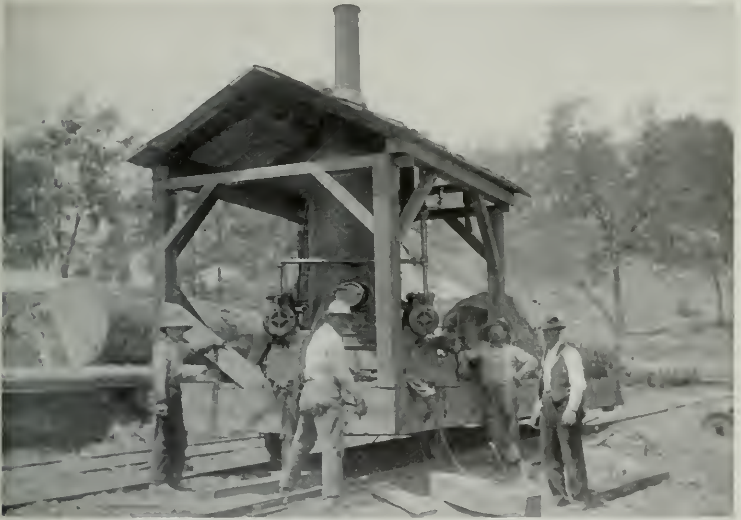
The mill is equipped with two band saws, one on each side of the log chute. One is a ten-foot mill, the other an eight-foot mill. Each band is fifty-seven feet long by fifteen inches wide and runs at a speed of 9,500 feet a minute. This is an improvement upon the circular saw, as the clearance on the band saw is an eighth of an inch less per cut than on the circular saw and in a season's run will save thousands of feet of lumber. The log carriage is operated by a steam piston, and on the back trip after a board is cut runs at

Transfer Point on Logging Road

Grading the road for the iron horse

Porter Engine and load of logs, on the narrow-gauge road the rate of twenty miles an hour. As fast as a board is cut it falls on live rollers and is carried to the edgers, where it is cut into the desired widths; it then passes on to another set of rollers and is deposited on the cut-off table. There are two sets of live rollers in the mill, with several switching stations where the lumber is switched on to the transfer chains and carried to the loading sheds, or boiler room. From the cut-off table the lumber is carried on transfer chains to the saws, and cut into the desired lengths. There are thirty cut-off saws mounted on a flexible shaft, independent of each other, all of which are controlled and operated by compressed air.

The compressed air plant has just been put into service this season, and has proven to be quite a success. One man with the compresser air device is now doing the work which formerly employed five men. The operator of the cut-off saws is located at one end, and over the table in front of him is located a key board, somewhat similar to the key board of a telephone exchange. He presses a key, which opens a valve allowing the compressed air to flow through the pipes and actuate the pistons on the cut-off saws, cutting the lumber into the desired lengths. The lumber is then deposited upon transfer chains and is carried out to the cars. The loading shed is equipped to load twenty-four cars at a time. All this is done by power, the only hand labor required being to place the lumber in position on the cars. The short ends of the lumber from the cut-off saws drop into a recess and are carried to a machine where they are ground up, loaded into cars by gravity, and used for fuel purposes at the Veneer plant at Barber.



Close view of the Loading Rig. Drums on opposite side of boiler.

All the edgers are operated by compressed air, also the donkey engines used for yarding and unloading logs. In connection with the saw mill there is a shingle mill with a capacity of 80,000 per day, also a lath mill. The engine room is equipped with all the necessary apparatus and accessories. The main engine driving the mill is a Reynolds and Corliss, manufactured by the Allis Chalmers Company, 1,000 horsepower, 32 inches by 48 inches stroke, running at sixty-five revolutions per minute. The driving wheel is twenty-two feet in diameter, with a four-foot face; the main belt is four feet wide. There are two air compressers for furnishing power for edgers, saws and engines. Two 80 kilowatt G. E. Co. direct current generators, engine driven, furnish light for the plant and the town of Sterling. The plant also includes two 500 gallons-a-minute steam pumps, Underwriters, whose engines are kept under pressure at all times, the steam never being allowed to drop below 50 pounds pressure.

The mill is splendidly equipped with fire fighting apparatus. The automatic sprinkler system, installed by the Pacific Fire Extinguishing Company, reaches every part of the mill and adjacent buildings. In addition to the sprinkler system they have several 3-inch monitors installed in different parts of the mill, water being supplied from the town gravity system with a pressure of 100 pounds to the square inch. The boiler-room contains five batteries of horizontal boilers, the capacity of each boiler being 560 horsepower, or a total of 2,800 horsepower. The fuel supply for the boilers is refuse from the mill, the sawdust from the band saws being carried in on transfer chains, and fed under the boilers automatically, one man looking after the boiler room. I might add that there are over seven miles of transfer chains in the mill which are used to transport sawdust, lumber, slats, etc. During the logging season and while the mill is running to its full capacity the company employs one thousand men in the vicinity of its Sterling plant. They usually operate from March to December. Following are some of the figures for the season of 1911:

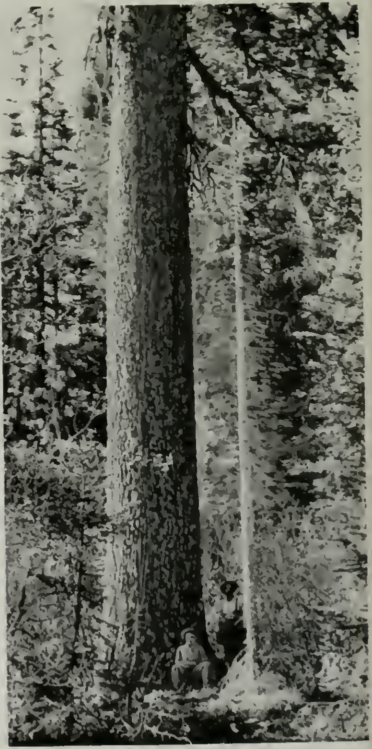
Total number of logs hauled from the woods to the mill, 83,591.

Total number of board feet in logs hauled, 52,579,317.

Greatest amount of logs delivered to mill in one month in board feet, this was the month of August, 1911, 8,112,000.

Greatest amount of logs delivered to mill in one day 359,903 feet.

Average amount of lumber per log, in the 83,591 logs, 629 feet.



Sugar Pine Tree, from which 21,400 feet of lumber was cut

15,000,000 feet of logs in pond to start season of 1912.

OUTPUT OF MILL

Cut for 1911, 40,387,329 feet.

Biggest days cut 360,928 feet in ten hours, this was done with picked logs to test the mill and see what could be done.

Average cut per day for 1911, 204,000 feet, ten hour day.

Record cut for one band saw and one side of mill, March 9th, 1912, 125,000 feet.

The Company also operates thirty miles of standard broad-gauge road from the mills to its factories at Barber, near Chico. These plants will be covered in a future issue of the magazine. The writer is indebted to Mr. F. Thatcher, Manager of The Diamond Match Company properties at Sterling, for this information and accompanying photographs.

Electrical Development League Notes

By GEO. C. HOLBERTON, President of the League.

G. C. Holberton

We take pleasure in this issue of our magazine in drawing attention to the remarkable success of this organization. Starting in a few months ago in an endeavor to promote closer social as well as business relations among the people interested in the various branches of our industry, the organization has grown to a membership approximating 150, and we have at each meeting, which takes place upon the second Tuesday of every month, an ever growing attendance.

On Tuesday, April 9th, the league had the pleasure of listening to a most interesting address delivered by Mr. Robert Searle, Vice President of the Rochester Railway, Light and Power Company. Mr. Searle mentioned many openings for the further development of our industry and told us of experiments now being conducted in large factories in the East, looking to the bringing out of appliances to encourage the consumption of electricity. Mr. Searle went so far as to draw our attention to the great benefits to be derived from sleeping out-doors, the only draw-back being the coolness of our climate, which could be overcome by a newly invented bed warmer which automatically kept the temperature between the sheets at just that point desired by the sleeper. He also drew attention to a new fireless cooker which in place of requiring a large amount of energy for a short time was so constructed as to connect to the system for 24 hours, absorbing a small amount of energy continuously and imparting same when desired for the more rapid cooking of the food. Mention was also made of a new system of storing energy by means of masses of metal submerged in water contained in an insulated vessel. Such a device said Mr. Searle, requires only approximately 150 watts fed continuously to have at all times available a large amount of hot water for instant use.

Altogether, Mr. Searle's talk was a most interesting one and showed great possibilities for the further development of the electrical industry in California.

As previously mentioned, the attendance was very large and included in addition to Mr. Searle, many men of note outside the league, of whom we might mention Mr. Hazard, one of the newly appointed members of the Railroad Commission, Mr. Preston Miller, General Manager of the Electrical Testing Laboratories of New York, and Dr. Thomas Addison, Manager of the General Electric Company.

Yours Truly
Thos. R. Parker
Napa Sept 13th 1902

IN MEMORIAM—THEODORE R. PARKER

BORN OCTOBER 21, 1838 DIED APRIL 1, 1912

THEODORE R. PARKER was a pioneer of the gas industry. Beginning in the early fifties, when the business was in its infancy, by splendid manhood and vigorous mentality he kept abreast of every advancement in his profession, weaving his best thoughts and fine mechanical skill into the cause, until he became inseparably a part of it. The gas business never had a truer friend nor more staunch supporter. His work and worth are recorded in substantial gas works construction, as well as in the proceedings of gas associations, and are indelibly fixed in the hearts and minds of the many friends who loved him and profited by his teaching.

He was born in New York City, October 21, 1838, and was educated in the public schools of the Eastern metropolis. At the age of seventeen he was employed as a full journeyman at the gasfitters' trade and continued this work until 1859, when he received the appointment of Superintendent of the Exeter, New Hampshire, Gas Works. He held that position three years and then set out for the West.

He came to California by way of Panama, arriving in San Francisco, April 28, 1862. In 1864 he accepted the position of Superintendent of the Marysville Gas Works, six years after its incorporation, where he became associated with the late David E. Knight and began the making of gas history. In February 1869 he moved to a larger field of usefulness in connection with the building and operation of the Napa Gas Works. There he remained for over thirty years. In addition to his duties as Superintendent of the Napa Gas Works he held a similar position with the Napa City Water Company from the date of its establishment until his death.

The organization of the Pacific Coast Gas Association July 11, 1893, brought the gas men of the coast together in close friendships and Theodore R. Parker was a moving spirit and a charter member of the association. At this time the coal gas-plant in Napa was equipped with the most modern type of full-depth regenerative benches, and the results obtained exceeded in excellence those of many of the best managed Eastern works. This was due to the skill and ingenuity of Mr. Parker, as he had applied his own improvements to the best knowledge then obtaining in the East, and his was the banner gas-works in California. Coupled with mechanical excellence was the highest degree of cleanliness possible in a gas works. The grounds surrounding the buildings were laid out in gardens of roses and cannas, while around the gas-holder tank were beds of calla lilies, and at the back of the garden, trellises covered with purple wistaria. Everywhere, inside and outside the works, was evident the touch of Mr. Parker's knowledge and good taste. Such was the man who bent his energies to making a success of the newly organized Gas Association and breathed his spirit into it.

At the second meeting he became Wrinkle Editor and successfully carried on this work until 1896 when he was elected President of the Association. Meanwhile he served as a Director in 1895. He contributed several valuable papers to the Association's Proceedings and further enriched them with wise discussions. His devotion to his chosen work is expressed in the following words taken from his Presidential Address in 1897:

"For all we have, as well as all that we are, is the result of labor and thought in the gas business."

The last paper contributed by Mr. Parker to the Association was entitled "Auld Lang Syne," and was read at the 12th Annual Meeting, July 19th, 1904. The paper tells the life story of the different California Gas Companies and is of inestimable historical value.

The Pacific Coast Gas Association confered upon Mr. Parker the greatest honor within its gift by unanimously electing him an Honorary Member, September 19th, 1911.

His Masonic affiliations included life membership in Marysville Lodge No. 9 F. and A. M., Napa Commandery No. 34 Knights Templar (of which he was Recorder for several years), and life membership in Islam Temple, Nobles of the Mystic Shrine of San Francisco.

Mr. Parker was married July 9th, 1862, at Exeter, N. H., and is survived by his widow, four sons and two daughters. His home life was ideal, love dwelt in his house, and happiness abounded. No shadow crossed the pathway of these two dear people over a span which would have covered half a century had he been spared until next July. The Rev. Richard Wylie, friend and spiritual adviser of Mr. Parker, in his funeral sermon delivered at Napa, April 3rd, paid the following tribute to his memory:

"The statement will not be questioned or doubted by any who have watched the growth of our fair city during the past two score of years that, within that period, there has been no one of our citizens who has personally done more—if indeed as much—with brain and hand, as has done T. R. Parker, to secure the success of our public utilities; to develop those important systems of water, light and heating which are so essential to the health and happiness of the people of our city. With a clear and inspired judgment as to all questions of engineering, with a distinct genius for the solving of mechanical problems, he has toiled most intelligently and persistently to obtain for this community in the realm of her public utilities, all that was possible and in keeping with the expert, practical wisdom of our times.

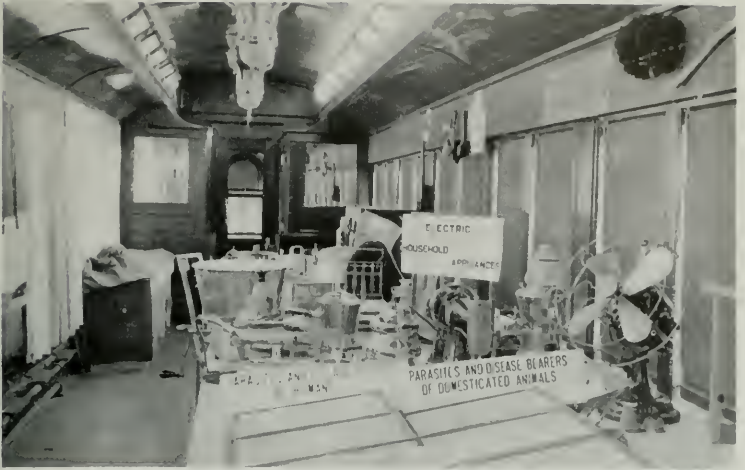
"While others have despaired, he has studied; while others have doubted, he has prayed; while others have slept, he has worked; while others have felt no special call to work for the public weal, he has discovered a heaven-given mission to accomplish for this city and community their permanent physical uplift and consequent moral and social betterment. On every home in Napa the benediction of his earnest life has descended to abide. Respected by all who knew him, deservedly honored in the assemblies of the most eminent scientific men of the State, beloved in the circle of his intimate friends, cherished in the home, where loving hearts of brave and devoted wife and dear and loyal children have ministered to him in the last sad scenes, he has now entered into the welcome rest, that follows the life-day of divine-like work."

E. C. JONES.

* * *

To cast a weight farthest; to vault a bar highest; to stick a bull downward between the shoulder blades, clean to the heart—these things command applause. To live a considered life; to do a good job today and a better one tomorrow; to meet your brother every time you meet anybody; to stand with your feet in the inevitable muck of convention and suck with your nostrils the high air of sane idealism—these things justify a man to his own conscience and before every decent tribunal. It is a man's business to be strong and to be trained. Man is his own devil. When he is strong enough to whip himself all other enemies are as straw, and may be laid flat by the push of a knuckle.

RICHARD WIGHTMAN. *Business Musings of Man—Alive, Strength and Skill.*



Car Exhibit of Household Appliances

Electrical Demonstration on Tour

By E. A. WEYMOUTH, Commercial Department.

E. A Weymouth

It is interesting nowadays to note the progressiveness of our modern educational system. The institutions are branching out in all directions and the resultant good work is observable everywhere.

Higher education for the training of men for professions has been in vogue from the beginning of history, but whereas once the student was compelled to travel to the educational center, in these days it is a case of "Mahomet and the Mountain." We find the institution traveling to the student.

Not so many years ago it became generally recognized that the wealth of the world was in the ground. With this discovery there sprang up schools of mines, engineering, agriculture, etc., formulating methods and popularizing themselves to such an extent as to force a large number of the educational institutions of the country to take them in. This has been particularly noticeable in the study of agriculture. In the agricultural college of today there is co-operation between producer and institution to the gain and advancement of both. Theory and practice are working hand in hand.

Our own State has been by no means backward in these advances, and some four years ago the University of California organized what is known as the "Special Agricultural and Horticultural Demonstration Train." It is a special train provided the University through the courtesy of the Southern Pacific Company, and is maintained and operated entirely at that company's expense. Seven cars are provided especially for taking on exhibits from the industries of the soil, and there are added a Pullman sleeper and diner for the accommodation of the instructors and the train crew. The general plan of operation is to take the train into as many sections of the State as railroad facilities will permit and time will allow.

One car illustrates the proper care and housing of several kinds of live stock on the farm, and there are some thoroughbred animals on hand as exhibits. Another car illustrates the principles of veterinary science, dealing with the prevention and care of common diseases of animals. From this we are led to the dairy, its products, practices, etc., thence to field crops, the increasing in yield of grain, soil fertility, fertilizers and the chemical and biological factors. Exhibit is made also of both beneficial and detrimental insects, birds and rodents. Again, there are illustrated the various kinds and uses of insecticides and fungicides.

A car is given over to horticulture and viticulture, dealing with improvements in these sciences, the different methods of planting, irrigation, etc. Poultry-raising is taken up and illustrated. The prevention of diseases as a matter of public health through the medium of sanitation, disease-carriers and parasites is exhibited and discussed. Domestic economy is gone into through exhibits suggesting better and easier methods in the farm home and the demonstration of labor-saving devices.

This season the train has an additional feature in the way of electrical demonstration which has been made possible by the co-operation of the Pacific Gas and Electric Company. Power wires from the company's plant are brought to within a short distance from the train at each stopping place. A reel of heavy reinforced flexible cord, some 200 feet in length and with a plug cut-out, is carried on the train, so that connection with the power-feeds is the work of but a moment and the train is ready for business almost immediately upon arrival.

The Department of Irrigation directs an exhibit illustrating two different methods of applying water to the soil. In part it consists of a small centrifugal pump with the motor direct-connected, pumping water from a concealed storage or surge tank. From the pump the water is delivered to a combination weir and stilling box, and then through a small ditch around a miniature field of alfalfa which has been marked off in checks by small ridges, thus to illustrate the check and flooding method of irrigation usual in alfalfa growing. The water again flows back into the surge tank for continual use.

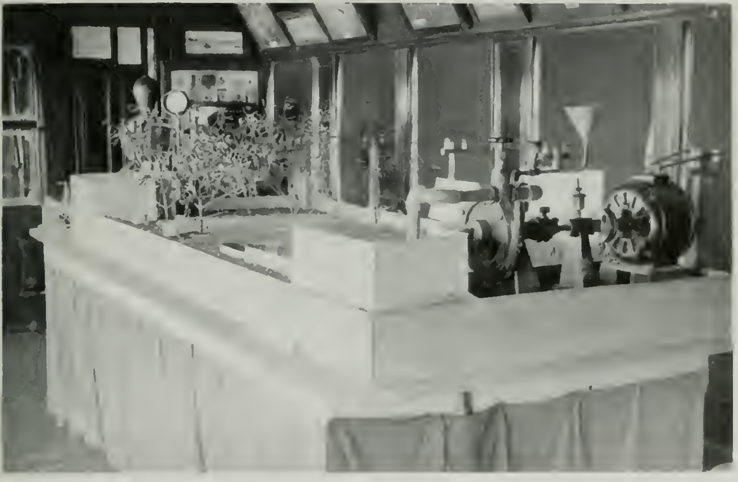
This exhibit is arranged on one-half of a long narrow table placed lengthwise in one side of the car. The remaining half of the table is arranged to illustrate the furrow method of irrigation customary in orchards. In localities where the conservation of water is a large item, as in the south, we find the underground pipe system. In the exhibit this is worked out in model. In practice, lines of cement or vitrified pipe are placed underground along the end or side or throughout the orchard at intervals, depending upon the surface elevation, character of the soil and area of the orchard. The pipe is laid plow-deep so as not to be an obstruction when cultivating, and at the end of each row of trees risers or hydrants are placed. From the risers the water flows through orifices to the furrows along each row of trees. Valves or gates are placed in the risers or in the pipe line, as the case may be, so that the water may be absolutely controlled; the water applied to any number of rows consecutively or alternately as the trees may require and local conditions demand, and with no evaporation or seepage loss from the source to the point of distribution where the placing of the water is actually desired.

A small Kewanee system for house supply service, the pump motor-driven and automatically controlled, is exhibited to illustrate one of the methods of convenience in handling and circulating the water in and about the farm home, or where the city street main is not available. To facilitate matters the water from the small pressure-tank of this system is piped to the weir-box that feeds the miniature underground pipe-line; and from the risers the water is carried by the furrows through the orchard. By means of a valve the water discharged to the weir-box is adjusted to somewhat less than pump capacity, so that the pump starts and stops automatically and repeatedly at regular intervals according to the water drawn from the pressure-tank. Thus the pressure-tank becomes a continual supply for irrigating the orchard in model, draining again back to the original surge tank.

These mechanical equipments with their silent, automatic, almost human operation, together with the display of models of such implements as scrapers, levelers, drags, ditchers, weir-boxes, and so forth, draw questions from visitors and open discussion on such points as different methods of irrigation, season, durance, quantities desired and methods of pumping to best advantage.

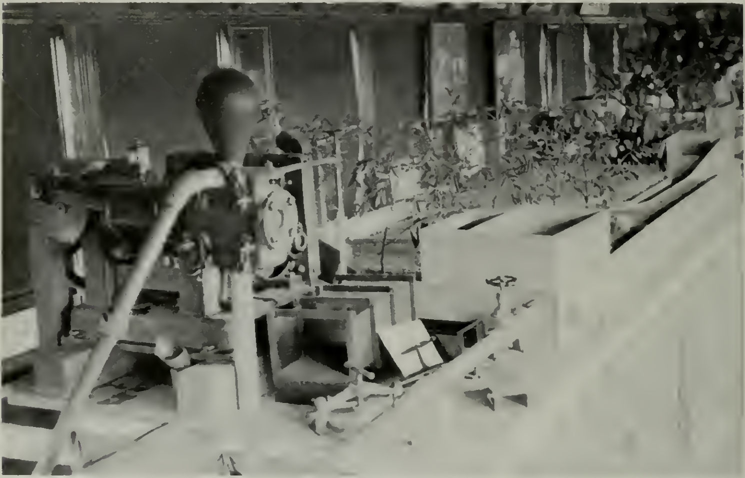
In the Home Economics department of the train some electric cooking appliances are exhibited, and such labor-saving devices as the little sewing-machine motor, electrical washing-machine and vacuum-cleaner. This operating and demonstrating exhibit is made possible through the courtesy of the Pacific Gas and Electric Company, which furnished the equipment and made arrangements with the power and lighting companies at each of the places visited so that current was furnished for their operation. This shows the great interest taken in the enterprise by the power companies of the State, and the general enthusiasm with which the train has been greeted on its journey of demonstration encourages further efforts in the same direction. The use of electricity on the farm is in fair way to be generally accepted as labor-saving, money-saving and money-making.

Prof. W. T. Clarke, connected for many



Method of Pumping for Irrigation

years with the University of California, personally superintends and conducts this course in agriculture. It is the largest undertaking of its kind in the United States and, perhaps, in the world. The present season consists of seven trips, covering practically the entire State. There remains now but one trip to complete the season's work. Each year since its organization the enterprise has met an attendance substantially larger than the previous year, and this year the attendance promises to reach 90,000. It speaks volumes for the interest the people of California are taking in this form of educational work.



Pressure System for Irrigating Exhibit

"Pacific Service" Follows Suit

Demonstration Car Has Already Taken the Field To be Described in Next Issue

And now comes the Pacific Gas and Electric Company into the electrical demonstration field, and through the courtesy and with the co-operation of the Northern Electric Railroad Company has a car out on tour.

In this are exhibited the different methods of irrigation and pumping with electric power, the utility of the electric motor on the dairy farm and the various electrical appliances for household comfort. The car was built at the Northern Electric shops at Mulberry and is being taken to various cities and towns covered by that Company's system. The tour opened at Chico on the 16th inst. and in the next issue of the Pacific Gas and Electric Magazine will appear an article giving full description of it and telling of the public interest it aroused at the various stopping places.

Electric Pumps a Source of Joy

The barren West cries for water; without it, only a howling wilderness is possible, but with its proper application to western soils, no more productive lands throughout the world can be found. The great power companies of the Coast are not asleep in regard to the future possibilities of power consumption in the small pumping plants now being so generously installed in the great valleys of the West.

The electrically operated pump is a source of revenue to the power company and a joy forever to the farmer. In most of our productive valleys an abundance of water is found within 30 to 60 feet below the surface of the ground, and a properly installed electrically operated pump possesses many advantages superior to any other known mechanism accomplishing the same end. The water is under the complete control of the land owner and he is not dependent in any sense upon his neighbors, for his supply stands ready to be applied at any instant, day or night. There are no boilers to explode, no gasoline tanks to catch fire, and above all, a perfect operation is possible without complicated parts to keep in constant repair. It is cheaper to install and costs less to operate, and this cost never fluctuates throughout the year. The complete equipment is easily started almost instanteously and, in the parlance of the up-to-date farmer, "it is on the job, day and night."

Above everything else, the electrically operated pumping plant makes the farm a more livable place. It lessens the so-called "continual round of pleasure" in performing the daily chores, for it brings power to the barn and with it the possibilities of delicate dishes for the invalid and a Sabbath day's rest for the house-wife. A thousand comforts are added to the daily life on the farm. The house, the cooler, and the barns can be lighted at any moment in sudden emergencies. Lower insurance rates on the barn and house make security and economy possible to a higher degree. A cool breeze provided by an electric fan is ever ready for the hot summer day, while a gentle warmth for the chilly spring and autumn days is possible from the electric heater. The long winter evenings strengthen the family ties by making the home more enjoyable with the soft, pleasing yet clear steady light of the electric lamp.

The great power companies, realizing the possibility of aiding in the development of prosperity and happiness in agricultural communities, deserve much credit for their cooperative spirit along these lines. The data they have gathered for practical instructions in installations of electric pumping plants is invaluable. The Pacific Gas & Electric Company of Central California has amassed much of this kind of information.

The independence enjoyed by the farmer, when electrically operated pumps are installed can hardly be conceived, without comparing his new surroundings with the previous condition of servitude under which he labored before. An opportunity of power consumption of electrical horsepower by the millions is thus opened to the great power companies and happy homes by millions are thus made possible in every commonwealth of our western empire.

From the *Journal of Electricity, Power and Gas,* March 2, 1912.

Is Never Turned Down

There's a man in the world who is never turned down, wherever he chances to stray; he gets the glad had in the populous town, or out where the farmers make hay; he's greeted with pleasure on deserts of sand, and deep in the aisles of the woods; wherever he goes there's the welcoming hand—He's the Man Who Delivers the Goods.

Code of Ethics for Engineers

The Electrical World, in its issue of March 16th, publishes the following Code of Principles of Professional Conduct adopted by the Board of Directors of the American Institute of Electrical Engineers.

GENERAL PRINCIPLES

1. In all of his relations the engineer should be guided by the highest principles of honor.

2. It is the duty of the engineer to satisfy himself to the best of his ability that the enterprises with which he becomes identified are of legitimate character. If after becoming associated with an enterprise he finds it to be of questionable character, he should sever his connection with it as soon as practicable.

THE ENGINEER'S RELATIONS TO CLIENT OR EMPLOYER

3. The engineer should consider the protection of a client's or employer's interests his first professional obligation, and therefore should avoid every act contrary to this duty. If any other considerations, such as professional obligations or restrictions, interfere with his meeting the legitimate expectation of a client or employer, the engineer should inform him of the situation.

4. An engineer cannot honorably accept compensation, financial or otherwise, from more than one interested party, without the consent of all parties. The engineer, whether consulting, designing, installing or operating, must not accept commissions, directly or indirectly, from parties dealing with his client or employer.

5. An engineer called upon to decide on the use of inventions, apparatus, or anything in which he has a financial interest, should make his status in the matter clearly understood before engagement.

6. An engineer in independent practice may be employed by more than one party when the interests of the several parties do not conflict; and it should be understood that he is not expected to devote his entire time to the work of one, but is free to carry out other engagements. A consulting engineer permanently retained by a party should notify others of this affiliation before entering into relations with them, if, in his opinion, the interests might conflict.

7. An engineer should consider it his duty to make every effort to remedy dangerous defects in apparatus or structures or dangerous conditions of operation, and should bring these to the attention of his client or employer.

OWNERSHIP OF ENGINEERING RECORDS AND DATA

8. It is desirable that an engineer undertaking for others work in connection with which he may make improvements, inventions, plans, designs or other records should enter into an agreement regarding their ownership.

9. If an engineer uses information which is not common knowledge or public property, but which he obtains from a client or employer, the results in the form of plans, designs or other records should not be regarded as his property, but the property of his client or employer.

10. If an engineer uses only his own knowledge, or information or data which by prior publication or otherwise are public property, and obtains no engineering data from a client or employer, except performance specifications or routine information, then in the absence of an agreement to the contrary the results in the form of inventions, plans, designs or other records should be regarded as the property of the engineer, and the client or employer should be entitled to their use only in the case for which the engineer was retained.

11. All work and results accomplished by the engineer in the form of inventions, plans, designs or other records that are outside of the field of engineering for which a client or employer has retained him should be regarded as the engineer's property unless there is an agreement to the contrary.

12. When an engineer or manufacturer builds apparatus from designs supplied to him by a customer, the designs remain the property of the customer and should not be duplicated by the engineer or manufacturer for others without express permission. When the engineer or manufacturer and a customer jointly work out designs and plans or develop inventions, a clear understanding should be reached before the beginning of the work regarding the respective rights of ownership in any inventions, designs or matters of similar character that may result.

13. Any engineering data or information which an engineer obtains from his client or employer, or which he creates as a result of such information, must be considered confidential by the engineer; and while he is justified in using such data or information in his own practice as forming part of his professional experience, its publication without express permission is improper.

14. Designs, data, records and notes made by an employee and referring exclusively to his employer's work should be regarded as his employer's property.

15. A customer in buying apparatus does not acquire any right in its designs but only the use of the apparatus purchased. A client does not acquire any right to the plans made by a consulting engineer except for the specific case for which they were made.

THE ENGINEER'S RELATIONS TO THE PUBLIC

16. The engineer should endeavor to assist the public to a fair and correct general understanding of engineering matters, to extend the general knowledge of engineering and to discourage the appearance of untrue, unfair or exaggerated statements on engineering subjects in the press or elsewhere, especially if these statements may lead to, or are made for the purpose of, inducing the public to participate in unworthy enterprises.

17. Technical discussions and criticisms of engineering subjects should not be conducted in the public press, but before engineering societies or in the technical press.

18. It is desirable that first publication concerning inventions or other engineering advances should not be made through the public press, but before engineering societies or through technical publications.

19. It is unprofessional to give an opinion on a subject without being fully informed as to all the facts relating thereto and as to the purposes for which the information is asked. The opinion should contain a full statement of the conditions under which it implies.

THE ENGINEER'S RELATION TO THE ENGINEERING FRATERNITY

20. The engineer should take an interest in and assist his fellow engineers by exchange of general information and experience, by instruction and similar aid, through the engineering societies or by other means. He should endeavor to protect all reputable engineers from misrepresentation.

21. The engineer should take care that credit for engineering work is attributed to those who, so far as his knowledge goes, are the real authors of such work.

22. An engineer in responsible charge of work should not permit non-technical persons to overrule his engineering judgments on purely engineering grounds.

Lemon juice, in the proportion of four parts to one part of pure glycerine, is excellent to sip when the throat is sore, or a cough troublesome. Many persons find that the same mixture cures chillblains and chapped hands when rubbed in nightly.

Thirty-horsepower traction engine on a farm

The Luxury of Modern Farm Life

By E. W. FLORENCE, Manager, Redwood District.

F W Florence

Life on a farm is not what it used to be. Time was when the humble tiller of the soil was to be seen working in the fields from sunrise until dusk, his labors never ending, apparently, and his life generally little better than Edwin Markham has written of and Millet painted in the "Man With the Hoe."

That is all changed now. A decade or so ago this round of unremitting toil was an absolute necessity for every farmer, no matter what his condition, for the reason that he had to get his crops in before the wet weather. Now, however, with the aid of new inventions, such as combined harvesters, traction engines, and other such evidences of man's resourcefulness, the farmer can sleep to quite a respectable hour in the morning, and make his journey between ranch-house and field in an automobile, instead of, as formerly, having to ride one of his plow horses. He lives in a comparative state of luxury, made possible by an increase in his profits, for which these new inventions are mainly responsible.

Take the Santa Clara Valley, for instance. Modern farm life in the land where, in early days, the old Spanish settler dispensed open hospitality to all, nearly approaches the ideal. The illustrations show one of the latest inventions in operation. It is a thirty-horsepower Johnson Traction Engine in use on the 250-acre farm of Calkins & Spalding. Some idea of the labor-saving capacity of one of these engines may be gathered from the fact that it will plow ten acres a day with a five-disc plow, or eight acres with a four-disc plow, and all at a cost of 75 cents an acre, which is at least fifty per cent lower than the cost of plowing under the old methods.

The ranch I have referred to is being laid out in apricots, cherries, prunes and peaches. Pending the time when the fruit trees will be in bearing, the proprietors purpose planting tomato vines throughout the whole in lines between the trees. "Pacific Service" comes in here, for the Pacific Gas & Electric Company has a contract for a fifty horsepower installation to drive a Layne & Bowler pump, which will be used for irrigating the orchard.

Each gallon of water put on this ground means money in the farmer's pocket, so the cost of the installation is not regarded as a matter for serious consideration. The trees will be sturdier, and will bear fruit far more quickly than if they were left to grow without care other than ordinary cultivation, so that with reasonable luck the investment will return principal and interest in less than no time.

How to Make a Pair of "Skis"

By EGBERT W. BEACH, Deer Creek Power Station.

E. W. Beach

The employes of Deer Creek have to use skis in winter to enable them to travel over the snow. They have not far to go for them, however, for both Wm. Keskey at the tunnel above the power house and John Frandy at the reservoir are skilled in ski-making.

Spruce is the best wood for the purpose because of its long grain, and there is plenty of it around. Last September Keskey and Frandy cut down a particularly good looking spruce, and obtained enough timber for the winter supply. I have watched both men at their work, and for the information of those who may have heard a good deal about these useful but rather cumbersome snow-skates, but have had no practical experience of them, I will endeavor to describe how they are made.

Skis have the shape shown in Figure 1. From the heart of a spruce log pieces are hewn nine feet long and not less than four inches wide by two inches thick. Care is taken to have the grain running edgewise from top to bottom, and lengthwise from end to end. The edgewise grain gives the best wearing surface, and the grain must run lengthwise in order that the ski may be formed true and straight.

The pieces are paired off, and planed until the edges are straight and the surfaces square with each other. The best-looking end is selected for the toe. Eighteen inches back from the tip of the toe, a grove three-fourths of an inch wide is cut running to the rear end.

This groove tapers from nothing at the toe to a depth of half an inch at the back. More important is the straightness of the groove. Much care is taken to plane it out as straight as the maker can see. The top surface of the ski is planed from a thickness of an inch or an inch and a half at the middle, to three-fourths of an inch at the rear, and three-eights of an inch at the bend of the toe, a foot and a half from the tip. The thickness is a uniform three-eighths of an inch where the bend is to be, and an inch at the tip.

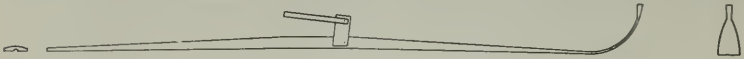


Fig 1

To bend the toe is the exciting part of the job. The wood will promptly split if imperfectly steamed, or if bent too quickly. Twenty inches of the front end is boiled in water for half an hour. Frandy then bends the toe over a section of large pipe, warmed by a fire on the inside. The tip of the toe is held against the pipe by a frame and slowly, very slowly, the toe is bent. Blocks brace the bend snug to the pipe. See Figure 2. Wedges are drawn under the blocks to fit the bend more closely to the pipe. A weight is placed on the middle of the ski to hold the bend until it is set.

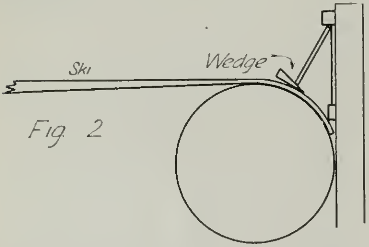


Fig 2

The hardest part done, the finishing touches are made. The toe is pointed, with a knob at the tip just for style. The edges of the top surface are rounded off except at the footrest in the middle, on each side of which gains are cut at about where the user's toe will be. Leather straps are fastened into these gains. Their width is three inches, and they are long enough to lace together over the wearer's boot. An auxiliary strap is riveted to these wide toe-straps, and passes around behind the wearer's boot. A thong passing over the instep keeps the auxiliary strap from dropping too low.

In order to arch the skies, they are tied together at the ends, bottoms facing, and an inch and a half block placed between them at the middle. The arch will set while the skis are seasoning, which takes about a month.

Before using, the skis are "doped" with a mixture composed of beeswax, paraffine and rosin, in 3-2-1 proportions. Being for lubrication, it is put only on the bottom, although a little on the top might help the ski to shed snow.

In going up hill a moccasin, a long canvas stocking, is slipped over the rear half of the ski. When without the moccasin the ski rider throws his heel over the edge of the ski and digs it into the snow. As a push rod and brake, an eight foot pole is used, which has a small block fastened within two inches of one end. The snow will pack beneath the rider's heel. This inconvenience may be partly overcome by tacking a piece of rubber on the footrest. The skis should just balance at the foot-straps. When the snow rides on the rear of the ski, the toe will be given an upward tilt if the ski-rider has to shuffle along on the level. It takes practice, you see, to become a ski-rider.

* * *

Some Things to Reflect Upon

The failures of life sit around and complain; the gods haven't treated them white; they've lost their umbrellas whenever there's rain; and they haven't their lanterns at night; men tire of the failures who fill with their sighs the air of their own neighborhoods; there's the man who is greeted with love-lighted eyes—He's the Man Who Delivers the Goods.

One fellow is lazy, and watches the clock, and waits for the whistle to blow; one has a hammer, with which he will knock, and one tells the story of woe; and one, if requested to travel a mile, will measure the perches and roods; but one does his stunt with a whistle or smile—He's the Man Who Delivers the Goods.

Walt Mason in *Talking Machine World.*

"We've Got Such Winning Ways"

Our Baseball Expert Enthuses Over the Onward March of the Company's All-Star Nine.

OUR third game this season was played on the University grounds in Berkeley, March 16th, and again we won from the Freshman Club, the score being 10 to 6 at the end of the sixth inning when the game was called. "Jim" Feeney's pitching and the fielding and hitting of our club were features.

On March 23rd, we played a practice game at Lobos Square, beating the "All Stars" 9 to 3. It was more one-sided than the score indicates. Swan and Fitzhenry both hit home runs.

The Company players simply romped around the bases in their game with the "Alameda Moose" on Sunday, March 30th. The game was called at the end of the seventh inning. No use continuing while we were on the long end of a 21 to 5 score.

Scanlon rapped out a three-bagger in the eleventh inning of the "Western Electric" game, which was played in Golden Gate Park, Saturday, April 6th, and that swat won for us—6 to 5.

So far, the "PACIFICS" have played and won six straight city games, and now Manager Melbourne has determined to write, in the near future, to several of the District Managers in regard to securing games with teams in their respective districts. We feel we can keep it up, all right.

M. B. MENSING.

Our (dry) Batteries

From left to right—Mensing, Scanlon, Hall and Feeney.

Wanted Suggestions Wanted

⁂

A NEW feature in the system of "PACIFIC SERVICE" is the inauguration of a SUGGESTION BUREAU, whose business it will be to receive and deal with suggestions concerning the work of the Pacific Gas and Electric Company in any and all of its various branches and departments.

The significance of this is that from now on suggestions are freely invited from one and all in the Company's employ. Distinctions of grade or rank will not be recognized in a move of this kind; the desire of the management which has authorized this new departure is that every employee of the Company, from the humblest to the highest, shall freely express any ideas that may occur to him at any time for the betterment of the service.

Suggestions will be received at headquarters of the Publicity Department, Room 601 Pacific Gas and Electric Building, 445 Sutter Street, San Francisco. There they will be taken care of, each being referred to the particular department or official of the Company best qualified to estimate and report upon its value. Credit will be given for all suggestions that are found to be of sufficient merit to warrant being acted upon. In order to avoid possible embarrassment, whenever the person sending in a suggestion desires that his name shall be kept in the background, the request will be scrupulously honored.

COME ALONG WITH YOUR SUGGESTIONS !

Whenever you think you see room for improvement in any branch of the service—there need be no exceptions—do not hesitate to let us know. Now is the time! Open the door to Opportunity!

Mark your contributions "Suggestion Bureau," and address them care of

FREDERICK S. MYRTLE,
MANAGER PUBLICITY DEPARTMENT.

Pacific Gas and Electric Magazine

PUBLISHED IN THE INTEREST OF ALL THE EMPLOYEES
OF THE PACIFIC GAS AND ELECTRIC COMPANY

JOHN A. BRITTON - - - - Editor-in-Chief
FREDERICK S. MYRTLE - - Managing Editor
A. F. HOCKENBEAMER - - Business Manager

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The Pacific Gas and Electric Company desires to serve its patrons in the best possible manner. Any consumer not satisfied with his service will confer a favor upon the management by taking the matter up with the district office.

Vol. III APRIL, 1912 No. 11

EDITORIAL

An event of more than ordinary importance in the life of the Pacific Gas and Electric Company was the annual meeting of stockholders held at the Company's head office in San Francisco on the 9th of April.

Not only were the reports presented of an unusually encouraging character but there was an infusion of new blood into the enterprise in the election of Mr. Samuel Insull of Chicago to a place on the Board of Directors.

Mr. Insull occupies a leading position among the men of the East who have successfully grappled with the public service problem. As President of the Commonwealth Edison Company he has been in constant touch with the latest developments in the field of light and power enterprise, and the news that in company with other Eastern capitalists he had become the purchaser of a large block of the common stock of the Pacific Gas and Electric Company was received here with much satisfaction. Mr. Insull is an up-to-date, go-ahead man and his election to the directorate of "Pacific Service" is in line with the progressive policy that has distinguished its management and that is responsible for the high place that it now occupies in the public favor.

Two additional new members of the board are Mr. C. O. G. Miller and Mr. Wm. G. Henshaw. Mr. Miller has been identified with the public lighting business in California for upwards of a quarter of a century. Mr. Henshaw is a banker of Oakland, whose name has been before the public for many years in connection with various development enterprises.

As stated before, this annual meeting was a highly successfully one from a business standpoint. President Frank G. Drum and Vice-Presidents Britton and Hockenbeamer in their several reports upon the business of the past year disclosed a highly satisfactory condition of affairs, both with regard to increased business and earnings and the Company's current financial condition. It was the first time the stockholders had been called together since the sale of $20,000,000 bonds in the East had made it possible for the management to carry out its cherished project in the way of extensive developments and improvements. It sounded pleasantly in the ears of those present, therefore, when Mr. Britton announced plans for the extension of the Company's hydro-electric system, which will mean additional generating capacity to the extent of 101,000 horsepower. At this time, also when there is talk of a possible shortage of water in the dry season it is good to know that another item in the list of improvements is the construction of a huge reservoir in the mountains whose capacity is to be 30,000,000,000 of gallons, enough water to supply the entire city of San Francisco for a period of three years.

Financial statements are always dry reading, more or less, so here it will be sufficient to say that the Company's net income for the year 1911, after deducting from the gross revenue expenditures for maintenance, operation, taxes, reserve for uncollectible accounts, casualities, bond interest, preferred stock dividends, sinking fund payments, etc., was $1,687,505.68. That this excellent showing is the result of careful, honest and businesslike management cannot be doubted. Mr. Hockenbeamer announced with pride that the Company is entirely free from floating debt, has ample working capital and is well provided with funds for all the work that will be necessary to meet the ever increasing demand for further developments in the light and power field.

A complete report of the present status of the Company's affairs is in course of preparation and will shortly be issued in book form. It will be dealt with at more or less length in the next issue of the Pacific Gas and Electric Magazine.

* * * * * *

Some time ago the Board of Trustees of the town of Antioch in Contra Costa County appointed a committee to secure material for a report on the practicability of the town operating its own light and power plant. The report was presented the other day and—"contrary to general expectations", as the Antioch newspaper put it—it is unfavorable to the projected municipal ownership.

The committee employed an expert who went into every detail of the question, and upon his findings the report was drawn up. This, in effect, stated that while in the opinion of the committee a municipal plant might be operated to advantage so as to supply the people of Antioch with electric power at a lower rate than they are now paying, an investigation of conditions forced the conclusion that it would be unwise to attempt any such departure at the present time.

The report considered the municipal plant question from two standpoints, namely, generating and distributing and distributing only. Regarding the former the report of the committee is quoted as follows:

"The first condition would require a bond issue of $55,000, of which $34,533 would be used for the generating plant and the balance for the distributing system. The cost at which power could be generated is estimated at $ .0283, or practically 3 cents per kilowatt hour. The high cost of generating is practically due to the requirement of almost a duplex system so that there would be no interruption of service, and the power demand is comparatively so small as to what the plant could turn out that it makes the generating cost high. Since the town is able to buy power as low as at least 1½ cents per kilowatt hour the committee does not deem it advisable to generate electricity."

Upon the question of distribution the report had to say: "If the town could buy power and distribute the same through a municipal system it would require a bond issue of about $24,000. By a new law a municipality is allowed to buy up privately owned public service corporations, and in the present case that course would seem advisable, for without the whole of the distribution of the power used the business would be too small to pay expenses."

The committee also took official notice of two facts, first, that there is competition between the electric companies doing business in California, second, that there is now in operation a public utilities law under which the power to regulate public service corporations is vested in a State Commission. This latter undoubtedly had its weights with the Antioch trustees who, like other thinking people in California, recognize this new law as the long sought for solution of the public service problem and better calculated to satisfy the public needs than any acts of a radical nature on the part of individual municipal authorities. In the end the committee reached the conclusion that so far as the matters under discussion were concerned the desired results could be obtained by abandoning the plan of generating electricity and advertising for bonds for street lighting and power for pumping purposes, and by fixing a maximum rate to be charged per kilowatt hour by any public service corporation operating within the town.

What the Press Has to Say

"Pacific Service" is Booming

Infusion of New Blood into the Directorate Evokes Favorable Comment

The annual meeting of the stockholders of the Pacific Gas and Electric Company was held yesterday, and in many ways it was the most important the corporation has known. Three new directors were added in the persons of C. O. G. Miller, William G. Henshaw and Samuel Insull. Miller and Henshaw represent local interests. Insull is president of the Commonwealth Edison Company of Chicago. With H. M. Byllesby and related interests he acquired recently 40,000 shares of the common stock of the Pacific Gas and Electric Company from the Halsey estate.

As the representative on the board of the Halsey estate Cyrus Pierce will retire from the directorate. George K. Weeks remains as the representative of the bond firm of Halsey & Co., which has been the banking house of the corporation. L. F. Monteagle and Joseph S. Tobin withdraw from the board.

The directors, as elected yesterday are:

Frank B. Anderson, Henry E. Bothin, John A. Britton, W. H. Crocker, E. J. de Sabla, Jr., F. G. Drum, John S. Drum, D. H. Foote, A. F. Hockenbeamer, C. O. G. Miller, William G. Henshaw, John Martin, Samuel Insull of Chicago, Louis Sloss, George K. Weeks.

The following officers were re-elected:

President, F. G. Drum; first vice-president and general manager, John A. Britton; second vice-president and treasurer, A. F. Hockenbeamer; secretary and assistant treasurer, D. H. Foote; assistant treasurer, Joseph C. Love; assistant secretaries, Charles L. Barrett and Morris K. Parker of New York.

The following income account statement for the year 1911 was presented:

Gross revenue		$14,604,609.30
Expenditures for maintenance, operation, taxes and reserve for uncollectible accounts, casualities, etc...		8,214,071.97
Net revenue		$ 6,390,537.33
Bond interest		3,254,133.27
Balance		$ 3,136,404.06
Preferred stock dividends	$600,000.00	
Sinking fund payments..	773,226.54	
Amortization of bond discount and expense.....	75,671.84—	1,448,898.38
Balance		$1,687,505.68

This statement shows the largest earnings the company has produced. Gross for 1910 was $14,299,228. Net earnings were in that year $5,938,623 as against $6,390,537 in 1911. The balance after providing for sinking fund and dividends on the preferred in 1910 was $1,551,844. For 1911 it was $1,687,505.

Payment of dividends on the common did not begin until this year. The disbursement for this account will amount annually to $1,500,000. Earnings, both in 1910 and in 1911, were sufficient to meet this. During 1912, however, there will be an additional interest charge amounting to approximately $350,000 a year. This will be more than offset by the increased earnings that the new bonds will make possible.

Although no figures have been given out for the earnings during the first quarter of 1912, it is understood that they are well in advance of those of 1911. The company will meet its dividend obligations with an ample margin to spare.

It was announced that the company was entirely free from floating debt, had an ample cash working capital and was also well provided with funds for future construction and plant enlargements.

General Manager Britton's report showed that during the year the company constructed 408 miles of additional gas mains, 125 miles of electric transmission lines, 500 miles of electric distribution lines and 4.1 miles of street railway track. This is in addition to the installation of a 20,000 horsepower Curtis steam turbine in San Francisco, a 16,000 horsepower Curtis steam turbine in Oakland and a 6,666 horsepower Curtis steam turbine in Sacramento. It also was announced that the company, preparatory to the influx of population that will follow the opening of the Panama Canal, had plans in progress for the construction of additions to its hydro-electric plants aggregating 101,000 horsepower.

One interesting feature of the plans for additional hydro-electric generating capacity is the construction of a reservoir with a capacity of 30,000,000,000 gallons of water, a sufficient quantity to supply the entire needs of the city of San Francisco for three years.

San Francisco (Cal.) *Call*, April 10, 1912.

Company's New Stock Issue

The Pacific Gas and Electric Company sold yesterday to a local syndicate $3,000,000 of its common stock, the proceeds to be used for new construction and other capital requirements.

This sale swells the amount of common stock or the bonds of the investing public to $33,000,000. Preferred stock outstanding amounts to $10,000,000. The Company is empowered to issue common stock up to the amount of $150,000,000, but, of course, that will not be done for years to come, if ever.

Holders of the $30,000,000 of common stock will be given an opportunity to buy some of the new $3,000,000 from the syndicate at $60 per share, payable in installments. No holder, however, can buy from the syndicate an amount in excess of 10 per cent of his old stock.

The sale in the East of the 40,000 shares of the Company's common stock belonging to the Halsey estate to a Chicago syndicate is reported to have been on a basis of $60 per share. It is authoratively stated that the sale does in no manner affect the local control of the big gas and electric light and power corporation. The fact that Chicago people gobbled up the stock at $60 is considered a most favorable comment on the integrity of the security and the character of the management.

San Francisco (Cal.) *Examiner*, March 21, 1912.

"Pacific Service" in Oakley

Work of Construction Started on New Line From Antioch Station

Within a very short space of time the people of Oakley and vicinity will be enjoying all the comforts and conveniences of electricity for light, power and irrigation purposes, as a crew of linemen in the employ of the Pacific Gas and Electric Company began the work yesterday of running a new line to Oakley from the Antioch station. This is the culmination of the hopes of the residents of that section, who for years worked for and impatiently awaited the coming of this improvement. It was made possible by their almost united support and the rapid development of that country during the last few years, as representatives of the company saw great possibilities for that section.

The line will be run direct to Oakley, where a distribution system is to be provided. All the business houses have already signed contracts for lights, while the trustees of two of the four churches have agreed to light the auditoriums with electricity. In addition to this, practically every residence will also be lighted by this modern method.

Not only will electricity be used for light, but a number of farmers intend to substitute motors for gasoline engines for irrigation purposes and other work where this power can be used to advantage.

The wire, and, in fact, all the material to be used will be new and adequate to supply power in any quantity desired. A branch line is also to be run to the plants of the Holland and Golden Gate brick companies.

The engineers of the company are now at work upon plans for extending the line to the J. E. Mitchell ranch near Knightsen, formerly known as the Portman place, and it may be this will be ready by the time the linemen reach Oakley with the present system. Nothing definite has been done toward extending the service to Knightsen, but it is expected that the line will ultimately reach there.

This line is the backbone of a system which in the next few years will reach every part of Eastern Contra Costa County not now supplied with light and power.

The improvement has been made possible by the energetic and systematic work of F. J. Southerland, manager of the Antioch district, who visited that section shortly after taking charge of this district and saw the great possibilities of developing the country. This is but one of several extensions and improvements which he has carried through successfully.

Antioch (Cal.) *Ledger*, March 23, 1912.

Free Service Connections a Boon

The Pacific Gas and Electric Company have announced their intentions of giving free service connections in the future on all their lines. This move will cause a large saving on the part of the consumers, and all contractors should show their appreciation of this move. While many contractors feel that the company should make these connections free, let us take advantage of the present move and induce people to connect to the lines, thus making business for ourselves.

Journal of Electricity, Power and Gas, March 16, 1912.

Filtration Plant at Auburn

H. C. Vensano, representing the Pacific Gas and Electric Company, was in the city Tuesday, gathering data and estimating the cost of installing a filtration plant in Auburn. He will make his report to the officers of the company at San Francisco.

A filtration system is much needed in Auburn, and we trust that the Pacific Gas and Electric Company will this year install such a plant here. The need of such a system is evident to all who have used Auburn water.

A filtration plant will not only benefit the citizens of Auburn, but also the Pacific Gas and Electric Company.

We trust the Pacific Gas and Electric Company will not stop at the preliminary work, but will make the filtration plant a reality.

Auburn (Cal.) *Republican*, March 7, 1912.

Installing the Meter System

Its Advantages Explaned to the People of Grass Valley and Nevada City

This morning it is expected that a crew of men will start work to install the meters for the Pacific Gas and Electric Company, Foreman Smith and a crew of men having arrived from Colusa. Service will be inaugurated on April 1st, and the officials in this city expected that the installation work would have been commenced ere this, as the materials to be used in the work have been on hand for several days.

In speaking of the efficiency of the present-day meter and how it is read, Dan C. Stewart, foreman for the Pacific Gas and Electric Company in this city, in an interview with a representative of The Union yesterday stated:

INACCURACIES ELIMINATED

"The electric meter of today is the embodiment of mechanical and electrical perfection; it represents the most advanced stage of the meter art. Years of study and experiment have made it one of the most trustworthy of all instruments used for the measuring and registering of commodities such as electricity, gas, water or steam.

"It is neat, compact and of rugged appearance, registering on one light or to full capacity of the meter with great accuracy; the voltage, frequency, temperature or other irregularities that occur in lighting circuits have no effect in the correctness of its readings.

HOW TO READ METER

"The little aluminum disc which rotates when the current is being used by the consumer, is mounted on a bronze shaft, the lower end resting on a sapphire; the upper end has a worm gear for transmitting the motion of the disc to the registering mechanism. The velocity indicates the amount of juice being consumed, and is controlled by the number of lights, or the power being used. The faster the rotation the more energy consumed, and the larger the bill; the slower the rotation the less energy consumed and the smaller the bill.

"To read the electric meter and thus keep tab on your consumption of juice by the hour, day, week or month is a very simple matter. Looking at the meter you will see three dials, with numbers 0 to 9 on each. The one to the right turns as the hands of a clock, the center one the reverse or to the left, and the third as the first. Starting with the dial to the right, the space 0 to 1 indicates one kilowatt, the space 1 to 2 indicates two kilowatts, the space 2 to 3, three kilowatts, and so on until one complete turn of ten spaces have passed, which shows ten kilowatts have been used. While this hand was passing through ten spaces the center hand has passed through one space, 0 to 1 in the reverse direction, preparing to hold the 10 kilowatts registered on the right dial. The dial on the right will again pass through the ten spaces, indicating another ten kilowatts as it again runs its circle, meanwhile the center one has passed through the space 1 to 2, so as to register the second ten spaces on the first dial, making twenty kilowatts used. The rest is a succession until the middle dial passes through its ten spaces, each space making ten kilowatts, making one hundred kilowatts consumed. The dial to the left has been passing through the space 0 to 1, registering the complete turn of the middle dial, indicating one hundred kilowatts. The meter will keep on thus registering up to one thousand kilowatts, when it will start at 0 again.

"Thus the dial to the right registers from 1 to 10 kilowatts, the center dial from 10 to 100 kilowatts, and the dial to the left from 100 to 1000 kilowatts. If electricity is furnished at ten cents per kilowatt, each space of the left dial mean ten cents. Each space of the middle dial means one dollar, and each space of the right dial means ten dollars.

ALL THIS FOR TEN CENTS

"For one kilowatt costing ten cents you could heat the baby's milk fifty times, or curl your hair twenty-five times, or make three cups of chocolate or coffee twenty-five times, or you could burn a thirty-two-candlepower tungsten light twenty-five hours, or a twenty-candlepower lamp forty hours, or a twelve-candlepower lamp sixty-six hours."

The meter question is much mooted at this time, and the above interview with Mr. Stewart will enlighten consumers as to the operation and reading of the new meters; also approximately what one kilowatt of electricity will do.

Grass Valley (Cal.) *Morning Union*, March 16, 1912.

New Gas Mains for Yuba

The Pacific Gas and Electric Company is preparing to put down larger gas mains on Bridge Street from Second to Plumas, and will improve the system in other parts of town. Meters are now being installed for all the residences and business houses for light and power and all flat rates will be discontinued after the first of next month.

Yuba City (Cal.) *Farmer*, March 22, 1912.

Domestic Science Lessons

By MRS. H. ROSE STEWART.

LESSON IX.—HARMONY IN SELECTION OF DISHES.

TO the refined, educated palate the lack of harmony in the combining and serving of foods is as painful as the clashing of colors or sounds is to the trained eye or ear. In the successful menu, foods are grouped together with a view to their natural affiliation to each other, and the highly civilized palate recognizes this on the instant. Yet the rule is violated day after day by those who claim to be experienced housekeepers and who would resent any inference that they were lacking in one of the essentials of their calling. Dishes are grouped upon the family table with no thought at all of their dependence one upon the other. The fact is ignored entirely that one food accentuates or, perhaps, modifies the flavor of another.

In a dinner menu, whether elaborate or simple, this rule holds good: The most important dish, the piece de resistance, is the meat; upon it, therefore, hinges the selection of the other dishes comprising the meal, whether they precede or follow the substantial course. If the meat is of a heavy nature, the soup must be light, just some tasty concoction which will excite the appetite, but not in any way satisfy it.

When an entree is served, it also takes its cue from the meat and must blend harmoniously with it in flavor. The variety of meat served also determines whether the entree is to be merely an appetizing dainty, a pleasing forerunner of the good things to follow, or whether it shall be substantial enough in its make-up to supply any lack of this quality in the main course.

The vegetables too, are determined by the meat. For example, lamb almost asks aloud for green peas, chicken for rice, pork for beans, and so on. The trained palate recognizes these complements instinctively.

The salad is no exception; for it, also, the sweet must all be selected with regard to the key-note sounded by the meat. Even the garnishings are to be selected with a view to harmony.

As with the dinner, so it is with the other meals of the day. The menus should be regarded as a whole and not in the light of individual dishes, if from the viewpoint of congruity, they are rightly balanced. No woman may class herself with skilled housewives until she can plan such a menu, until she has the art of the harmony of foods at her finger tips, so to put it. This knowledge in many instances is a matter of inheritance, instinctive one might say. Again it must be acquired by study, observation and experience. But it is well worth the time spent in its cultivation; for the wisely planned meal is one of the best appetizers there is.

MISCELLANEOUS RECIPES.

STUFFINGS

VEAL STUFFINGS

3 cups stale crumbs
3 onions chopped fine
1 teaspoon salt
½ teaspoon white pepper
2 tablespoons chopped parsley
½ cup melted butter or suet.

POULTRY STUFFING

1 quart stale bread crumbs
Salt, pepper, and dried thyme to season highly
½ cup melted butter

CHESTNUT STUFFING FOR POULTRY

1 pint fine bread crumbs
1 pint shelled and boiled French chestnuts chopped fine
Salt, pepper, and chopped parsley to season
½ cup melted butter.

Small raw oysters, or finely cut celery may be substituted for the chestnuts, omitting the parsley.

STUFFING FOR PORK

3 large onions parboiled and chopped
2 cups fine bread crumbs
2 tablespoons powdered sage
2 tablespoons melted butter or pork fat
Salt and pepper to taste.

STUFFING FOR GEESE AND DUCKS

2 chopped onions
2 cups mashed potatoes
1 cup bread crumbs
Salt, pepper, and powdered sage to taste.

STUFFING FOR TOMATOES, GREEN PEPPERS, ETC.

1 cup dry bread crumbs
1/3 teaspoon salt
1/4 teaspoon pepper
1 teaspoon onion juice
1 tablespoon chopped parsley
2 tablespoons melted butter.

Hominy, rice, or other cooked cereal may take the place of crumbs.

BAKED BREAST OF MUTTON

Required:—A small breast of mutton, carrots, onions, thyme, pepper and salt, parsley, bread crumbs. Sew the mutton in a very thin cloth to keep it in shape. Lay it in a stewpan with carrots, onions, parsley, thyme, salt, and peppercorns. Let it stew gently, allowing a quarter of an hour for each pound. Take up the mutton, remove the cloth, and place it on a baking dish. Brush over the hot butter, dredge with flour, set in a hot oven for half an hour, basting freely with its broth. A few minutes before dishing, strew it thickly with bread crumbs. Serve very hot. Hand gravy in a tureen and red currant jelly in a glass dish.

BAKED HAMBURG STEAK

Three pounds of round of beef and one-quarter salt pork ground together. Two eggs, six crackers, one cup of milk, one heaping teaspoonful salt, one-half teaspoonful pepper. Cover and bake two hours, sprinkle bits of butter and cracker crumbs over top. I use a bread pan. Good eaten hot or cold. Gravy can be made form the pieces in the pan.

CALIFORNIA RAISIN SANDWICH

Delicious for afternoon teas, picnics, and children's lunches. Chop fine one cup of seeded raisins, together with one cup of nuts, preferably walnuts, mix with whipped cream or the white of an egg beaten, season with salt. Spread between slices of bread cut very thin.

RAISIN SALAD

1 cup celery cut in pieces
1/2 cup walnuts, cut in pieces
1/2 cup chopped raisins.

Combine and serve on a lettuce leaves with Mayonnaise dressing or Cream Dressing.

FRUIT CHEESE

One pound each of raisins, figs, dates, currants, blanched almonds, and two pounds of walnuts. Grind fine and mix well and compress tightly and let stand for two or three days, then cut into squares and roll in powdered sugar.

CALVES' FOOT JELLY

Wash and divide four feet, remove all the fat. Weigh them, put them in a saucepan with two cupfuls and a half of water to every pound, cook very slowly for seven hours, strain and allow to stand for twelve hours, then remove the fat. Put one quart of the stock into a saucepan, add six tablespoons of sugar, two inches cinnamon stick, three cloves, one bay leaf, one blade of mace, two teaspoonfuls of coriander seeds, the rind and strained juice of three lemons, three crushed egg shells, and the beaten whites of three eggs. Whisk over the fire till they boil, remove the whisk, boil for one minute, draw to one side of the fire, and allow to stand to settle for ten minutes. Pour some boiling water through your jelly bag, then pour through the jelly; the first of the jelly may require pouring back through the bag. Add one-half cupful of the best brandy and one-half cupful of sherry wine to the jelly. Pour into a wet mold, set in a cool place till firm, dip in tepid water and turn out carefully.

SUET PUDDING

1 cup suet
1 cup sugar
1 cup chopped raisins
2 cups flour
1 teaspoon salt
1 teaspoon soda
1 cup sweet milk
Spice to taste.

Steam 2 hours.

RAISIN PUFF

2 cups flour
$\frac{1}{2}$ cup butter
2 eggs
1 cup milk
1 cup raisins
2 teaspoons baking powder

Steam 1 hour.

ORANGE FLOAT

1 qt. water
Juice and pulp of 2 lemons
1 coffee cup sugar

When boiling add to it four tablespoons corn starch, mixed in water, let it boil fifteen minutes, stirring. When cold pour it over four or five slices oranges over the top, spread the beaten whites of three eggs sweetened and flavored with vanilla.

USES FOR LEMONS

Perhaps few housewives have ever realized all the usefulness of the lemon; its peel, if grated and bottled, then stored in a dry cupboard, will provide delicious flavoring for cakes and curries all the year round; thinnest slices of the outer peel, dropped into a thick boiling syrup of loaf sugar and water, will become crystalized after being spread out to dry upon trays and serve to ornament the top of cakes or puddings; sections of lemons, with the peel on, may be boiled a few minutes in a similar syrup, then dried, and become delicious wholesome sweetmeats of pretty appearance. Lemon pulp, boiled or fresh used instead of milk to moisten a cake mixture, gives a rich flavor.

Lemon marmalade requires a pound and a quarter of sugar to every pound of fruit; it can be sliced thin or cut into the finest shreds, and half a cupful of sago to six pounds weight of fruit gives a softer taste and more transparent jelly. It is an admirable plan to use half lemon pulp and half that of vegetable marrow in making clear jelly, which can either be spread on bread as jam, or turned out in a shape for a sweet, garnished perhaps by glace cherries cut in halves reposing on leaves of angelica.

Lamb, whether baked, roasted or fried, is improved by being sprinkled with lemon juice. Tea that has an unpleasant scented flavor can be rendered palatable if a slice of lemon peel is placed in the pot, or three or four drops of juice are dropped in at the last. A drink that nearly all young folks like can be made by dissolving two lumps of castor sugar in as much lemon juice as will cover them, then filling up the glass with boiling water.

Fried potatoes, whether in quarters, slices or chips, gain in flavor by being dipped, when nearly cooked, in lemon juice, or having a little added to the fat used in cooking. The strong taste of dripping, when employed for puddings, cakes, pastry or frying fish, is quite removed by the addition of a few drops of the juice of this valuable fruit. A real tonic "pick-me-up," sure to promote appetite, if taken a quarter of an hour before a meal, can be made by squeezing the juice from one lemon into a tumbler, sweetening by a teaspoonful of honey or golden syrup, filling up with really boiling water, and then adding three or four drops of essence of ginger.

A cure for indigestion can be made by pouring a pint of boiling water over the fresh outer peel of a lemon, letting it stand for an hour or two, then adding a pennyworth of essence of peppermint, obtainable from any chemist. This should be sipped cold, ten minutes after each meal, a small quantity at a time.

PERSONALS

One of the most interesting weddings of the season took place at Ross Valley on Wednesday, April 10th, when Miss Frances Martin, daughter of Mr. John Martin, became the bride of Duval Moore.

The announcement of Miss Martin's engagement followed an automobile tour of Europe made by the Martin family last year when Duval Moore, who is a son of Mr. and Mrs. George A. Moore, accompanied them as their guest. The young couple, both of whom are prominent socially, came in for a perfect flood of congratulations, and many were the functions given in honor of the bride-elect during the few weeks between her return from abroad and the happy event.

The marriage was solemnized at St. John's Episcopal Church at Ross, within a stone's throw of Mr. Martin's beautiful country home. The sacred edifice was transformed into a bower of blossoms, all sorts of spring flowers blending their delicate hues. The bride, who was given in marriage by her father, was attired in the conventional white satin, with rose point lace, and carried a shower bouquet of orchids and lilies of the valley. Her only jewels were a diamond and pearl necklace, one of the gifts of her parents, and a diamond brooch, the groom's present. The maid of honor, Miss Hazel Dimmick of Philadelphia, was also attired in white. The bridesmaids were the Misses Marian Miller, Vera de Sabla, Gertrude Thomas, Virginia Newhall, Margaret Belden and Frances Newhall. Their gowns were of the picturesque fashion of the '30's, with little jackets of taffeta and skirts of chiffon and picture hats of taffeta and lace. Each carried a basket of lilacs, tulips and hyacinths, and there arose a ripple of admiration among the throng in the church as they entered. Kenneth Moore, brother of the bridegroom, was best man, and the groomsmen were Jack Martin, Walter Martin, Harry Weihe, Willard Barton and Arthur Hooper.

There was a very large attendance of people prominent in the social swim on both sides of the bay. The wedding ceremony was followed by a reception at the Martin residence, which was profusely adorned with flowers. After the reception the happy couple left on their honeymoon, to be gone several months. Upon their return they will make their home in San Francisco.

It is with deep regret that we learn of the death of Mrs. E. C. Monahan, wife of Superintendent Monahan of Stockton Power Division, who on March 31st last, succumbed to an illness that had lasted over a period of nearly three years. Monahan has a host of friends in the company's service, all of whom deeply sympathize with him in his bereavement.

S. P. Skoog has resigned his position as solicitor in the New Business Department of San Francisco district, to become manager of the Service Department of the Pacific States Electric Company, the largest electrical supply house on the coast.

Manager George C. Holberton, of the San Francisco district, announces the consolidation of the Gas Main Department with the Service, Complaint and Meter Department into what will be known as the Gas Distribution Department. D. E. Keppelman has been placed in charge.

A separate Teaming Department is created and placed in charge of F. Affleck, who will report directly to Mr. Geo. C. Robb, Superintendent of Supplies.

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PACIFIC GAS AND ELECTRIC COMPANY

CITIES AND TOWNS SUPPLIED WITH GAS, ELECTRICITY, WATER AND RAILWAY

Service Furnished	Number of Towns	Total Population
Electricity	187	1,081,222
Gas	49	978,167
Water	10	45,825
Railway	1	60,000

Place	Population
Alta	20
[1] Alameda	25,000
[2] Albany	800
Amador City	200
Adams John	25
Alleghany	200
Alto	25
Angel Island	280
[5] Auburn	2,375
Agua Caliente	100
Alvarado	900
Antioch	3,000
[2] Barber	500
[2] Belmont	350
Ben Lomond	800
Belvedere	1,000
Benicia	3,360
[2] Beresford	25
[2] Berkeley	40,000
Biggs	750
Big Oak Flat	20
Brentwood	200
Broderick	200
Brown's Valley	50
Byron	200
[2] Burlingame	4,000
California City	25
Camp Meeker	200
Campbell	600
Centerville	1,000
Centerville	20
[2] Chico	13,000
[2] Colma	3,500
[2] Colusa	1,500
Concord	1,500
Cemeot	1,500
[5] Colfax	500
Cordelia	150
Corde Madero	350
Crockett	2,500
Crow's Landing	375
Cupertino	50
Daly City	250
Danville	250
Davis	750
Decoto	350
de Sabla	25
[6] Dixon	1,000
Dobbins	50
Davenport	1,000
Drytown	20
Durham	500
Dutch Flat	500
Duncan's Mills	150
[2] Easton	300
[2] East San Jose	1,660
Eagle's Nest	50
Edenvale	500
Eldridge	500
Elmira	150
El Verano	400
[2] Emeryville	5,000
Encioal	100
Fairfax	500
Fairfield	834
Forestville	100
Felton	300
[1] Fresno	30,000
[2] Fair Oaks	250
Folsom	1,800
Gilroy	2,000
Glen Ellen	500
Gold Run	100
[5] Grass Valley	4,500
Gridley	1,800
Groveland	125
Guerneville	500
Hammonton	500
[2] Hayward	4,000
[2] Hillsborough	1,000
Hollister	3,000
Hookston	75
Ignacio	100
Ione	900
Irvington	1,000
Jackson Gate	100
Jackson	2,035
Kennedy Flat	20
[2] Kentfield	250
Knight's Landing	350
Lake Francis	5
Lathrop	300
Live Oak	200
Livermore	2,250
Los Gatos	3,000
Larkspur	600
Lincoln	1,400
[2] Lomita Park	100
Los Altos	500
[5] Loomis	400
Martioez	5,000
Martell	150
[2] Marysville	7,000
Mayfield	1,500
[2] Menlo Park	1,500
Meridian	300
[2] Millbrae	300
Milpitas	300
Mill Valley	2,500
Mission San Jose	500
Mokelumne Hill	150
Monte Rio	50
Moulton's Landing	30
Mountain View	2,500
Mt. Eden	200
Mare Island	500
[2] Napa	7,000
[3] Nevada City	2,700
New Chicago	10
Newark	700
[5] Newcastle	750
Newman	1,000
Niles	800
Nicolaus	75
Novato	250
[2] Oakland	230,000
Oakley	80
[2] Palo Alto	6,300
Pacheco	200
Penryn	250
Patterson	300
Penn Grove	300
[2] Petaluma	5,500
[2] Piedmont	1,720
Pike City	200
Pinole	1,500
Pittsburg	2,372
Pleasanton	2,000
Point San Pedro	20
Port Costa	600
[2] Redwood City	3,200
[2] Richmond	10,000
Rio Vista	884
[6] Rocklin	1,000
[5] Roseville	2,600
Rodeo	500
[2] Ross	500
[4] Sacramento	60,000
San Andreas	200
[2] San Anselmo	1,500
[2] San Bruno	1,500
[2] San Carlos	100
[2] San Francisco	416,912
[2] San Jose	30,000
[2] San Leandro	4,000
San Lorenzo	100
[2] San Mateo	6,500
[2] San Quentin	2,500
[2] San Rafael	6,000
San Pablo	1,000
Santa Clara	6,000
Santa Cruz	16,000
Saratoga	50
[2] Santa Rosa	12,000
[2] Sebastopol	1,200
Sausalito	2,500
Smartsville	500
[2] South San Francisco	2,500
[2] Stanford University	2,600
Sonoma	1,200
Stege	1,000
[5] Stockton	30,000
Suisun	1,200
Sutter City	150
Sutter Creek	1,500
Sunnyvale	1,500
Tiburon	400
Tormey	20
Towle	100
Tracy	1,200
Vacaville	1,200
[2] Vallejo	15,000
Walnut Crek	350
Warm Springs	200
Watsonville	4,500
Wheatland	1,400
Winters	1,200
[2] Woodland	3,200
Yolo	400
[2] Yuba City	1,200
Total	1 136,222

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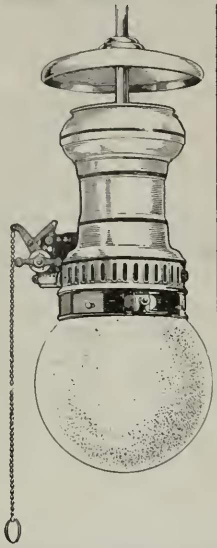

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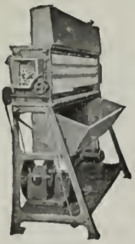

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Published Monthly by
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SAN FRANCISCO

VOL. 3 MAY, 1912 NO. 12

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Pacific Gas and Electric Magazine

Vol. III

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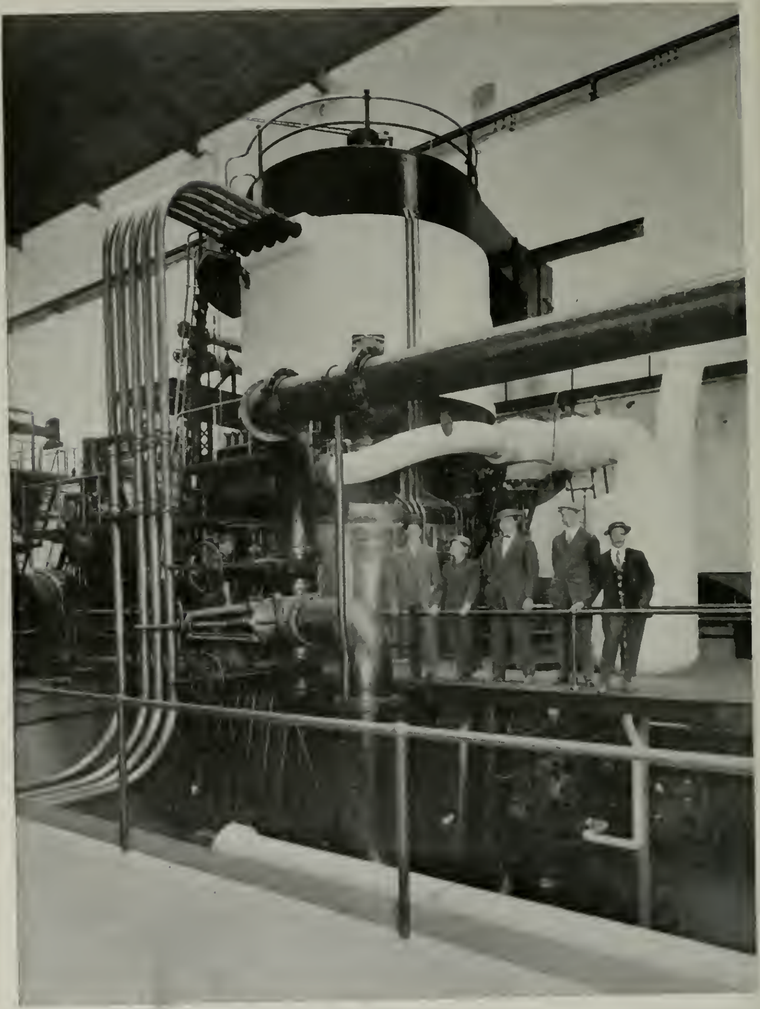

POLYTECHNIC HIGH SCHOOL BOYS INSPECTING THE BIG TURBINE AT STATION "A", SAN FRANCISCO

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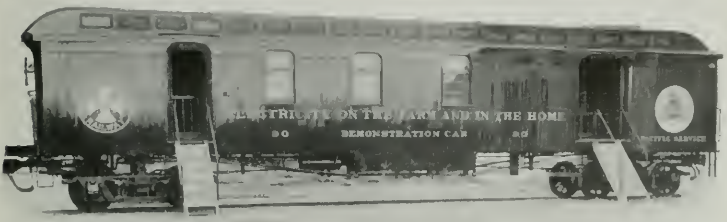
PACIFIC GAS AND ELECTRIC
MAGAZINE

VOL. III MAY, 1912 No. 12



Our Travelling Electrical Exhibit

By E. A. WEYMOUTH, Commercial Department.

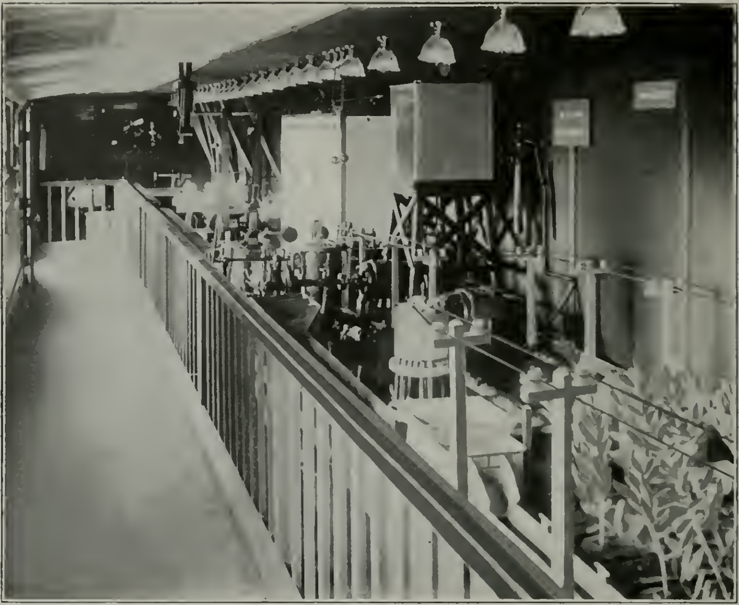
E. A. Weymouth

Our Electrical Demonstration Car, to which reference was made in the last issue of the Pacific Gas and Electric Magazine, started on its tour of the Sacramento Valley at Chico, April 16th. Figuratively speaking it went off with a bang amidst red fire and rockets.

People consider it a privilege occasionally to witness some County or State Fair, or observe the display of some new article in a merchant's window. It remains, however, for the Pacific Gas and Electric Company to build its own fair, fill its own display window, mount the entire exhibit on wheels and transport the whole equipment to the very doorstep of the people.

The undertaking was planned and the exhibit constructed under the direction of the Commercial Department of our company, through the courtesy and co-operation of the Northern Electric Railway Company, over whose system the car is now being transported and exhibited in nearly every city and station between Chico and Sacramento. To complete this preface, the electrical demonstration car is a railway car of standard gauge in which is installed different apparatus and appliances to show how electricity can be and is advantageously used on the farm and in the home. The exhibits are displayed in actual operation and everything is practically demonstrated.

The exhibits are arranged in booths lengthwise on one side of the car and in front of



them is a railing before which the visitors pass to view the display. Although the university train with agricultural exhibits and the private demonstration car of one nature or another may not be particularly new, yet so far as the writer can ascertain, this is the first purely electrical demonstration car that has ever been constructed and operated to show the diversified uses of "Electricity on the Farm."

For the benefit of those who may not be able to see the car we will describe somewhat in detail the construction of the exhibit and what it includes. The car is of the baggage car type, the outside painted Northern Electric yellow, the golden yellow of the California poppy. It is lettered in aluminum and is identified by the monograms at each end as shown in cut at the head of this article. Portable steps with hand rails afford easy entrance and exit. Behind the railing where the exhibits are arranged, the car is entirely covered with a dark brown burlap. The burlap is run vertically and the joining edges covered with small batons, which foot on a baseboard, all stained in color to match. This simulates the Mission finish of interior decoration and serves the purpose of concealing some 1,500 feet of wire and conduit utilized in running electric circuits and connections to operate the several devices. Partitions of burlap mark off the different booths. In front of the booths overhead and running the entire length of the car is a row of Mazda 25-watt incandescent lamps with holophane shades. The bank of lights fronting each booth is under separate control and turned on or off with pendant snap switches.

There is a main switch board at one end of the car to control the different circuits. The current when town service is available is brought in from the outside and tapped on to this board. Where this is not possible a small belted generator-set is installed in one end of the car as an auxiliary. The direct current is then taken from the trolley wire and transformed to 110 volts single-phase which is better adapted to all the purposes here desired.

Nearly half the car is devoted to the subject of irrigation and the use of electric power in pumping. A miniature orchard is laid out with furrows running lengthwise through several rows of trees, the furrows being fed from a main ditch in which gates are inserted to control the water in feeding the furrows. A model Hill-Tripp deep-well pump, motor vertical and direct connected, pumps the water for irrigating the orchard. Water is carried in a concealed tank underneath the table on which this exhibit is arranged and after being pumped to the ditch and flowing through the orchard is collected again in a blind ditch and conducted back to the original supply tank.

A small 1″ centrifugal pump with motor direct connected, likewise pumps water to a combination stilling box and weir, thence to a main ditch and through an "alfalfa field" which by ridges is divided into checks as is usual in the flooding method of irrigation.

These miniature fields are laid out in a long, shallow galvanized iron pan on a long table. The pan is filled with a mixture of fine sand and cement, and moistened as in laying concrete. A small mesh wire is imbedded in the mixture for re-enforcement that the cement may be laid as thin as possible to diminish the weight and still be not too fragile. The furrows and checks are then moulded in the concrete with the proper fall so as to give sufficient flow to the water. The surface of

3

the orchard is painted to represent soil and the alfalfa field is painted green to make it more realistic as well as rendering the surface of the cement impervious to the water flowing over it. A small rail fence between the two fields, a model pump house and a miniature transmission line serves to complete the representation.

In one corner of the alfalfa field is a small motor and belt-driven centrifugal pump which supplies an elevated tank with water to show the operation of the float switch and illustrate the automatic control of pumping water as applied to house service. The front of the tank is of plate glass that the action of the float may be plainly visible.

The next booth contains a small ice and refrigerating machine. This is the smallest ice machine made and is a home product manufactured by the Pacific Refrigerating Machine Company in Alameda. It has but one-sixth of a ton refrigerating capacity and is ideal for the farm or dairy as well as for many other private uses. The machine itself is exceedingly simple, reliable and inexpensive, requiring but a ½ horsepower motor to operate the pump. A 25-pound cake of ice is frozen in from about ten to twelve hours. At the same time the ammonia coils in the refrigerator box holds the atmosphere in there at the required low temperature for refrigeration. The attractive design and finish of the box with the perfect running little machine keeping the exposed pipes frosted makes indeed an attractive exhibit. In this booth also is displayed a small motor-driven De Laval cream separator and also a motor driving a line shaft which in turn drives a small emery wheel and grindstone, all of which is illustrative of the many ways the electric motor may be utilized on the farm. Placards hung here and there refer to the possibility of similarly applying the electric motor to operate feed-cutters, grinders, churns, etc., that can not be displayed for lack of space.

The rest of the car is devoted to the household. In the model kitchen is exhibited the electric cooking range, tea kettle, small hot plate and a small motor for polishing silver and grinding the kitchen butcher knife. An electric fan is operated here. The next booth represents the dining room. On a small dining table is placed the chafing dish, percolater, samovar, toaster and small hot plate. An electric cigar-lighter, that the gentlemen of the house may not be neglected, rests to one side on the mantel. The dining room is heated by a tubular air-heater. The booth representing the bedroom contains the electric hair dryer, massage vibrator, curling iron heater, heating pad and nursing bottle warmer. Here the radiant heat and cheerful glow of the luminous radiator furnishes warmth if desired. Lastly, in the general utility booth is exhibited the washing machine, sewing machine with motor attached, vacuum cleaner and electric flat iron. Another electric fan here keeps you cool.

The tables are covered with suitable table cloths and the floor of the household end of the car is carpeted in brown, the kitchen having brown linoleum; all of which carries out the general color scheme pleasing to the eye and to withstand wear.

Thus the exhibit is made as complete as space will permit. Signs and posters are displayed on the walls of the car; literature descriptive of the different apparatus and appliances exhibited, and pamphlets on irrigation are distributed among those interested. The entire demonstration is made both interesting and instructive. The popularity and success which the project is meeting with is measured well by the good crowds in attendance.

"Do it with electricity" is our slogan.

Flipp—I hear that they use all sorts of materials in the manufacture of illuminating gas nowadays.

Flopp—True, they even make light of the consumers' complaints.—Tit-Bits.

"How We Visited Station 'A' and What We Thought of It"

Polytechnic High School Boys and Their Tutor Write Their Impressions in Their Own Way

By S. A. JOHNSON and H. MEYER—Class '13.

ON Saturday, April 27, through the kindness of Mr. Lawrence F. Walsh, several of us pupils of the Polytechnic High School visited Station "A", the main steam plant of the Pacific Gas and Electric Company.

On entering the engine room we were impressed by its size and the noise made by the powerful machinery at work. We noticed the large number of machines. Extending down the middle of the room were four vertical-compound and four triple-expansion engine-generators, the former generating at 500 and the latter at 11,000 volts. Besides these we found one large turbine doing as much work as all the rest put together. Before reaching the turbine we passed a formidable switch-board decorated with white, red and green lights and myriads of switches and meters. A young fellow who was watching a volt meter and a frequency meter and who very unconcernedly turned a wheel occasionally interested us very much.

We then came to the large turbine, a masterpiece of modern engineering, which develops 24,000 horsepower at 720 revolutions per minute. The generator driven by it gave out 15,000 kilowatts. The turbine and generator ran on a vertical shaft which was supported by a step-bearing. There was so much weight on this bearing that oil had to be forced in at a pressure of 1,150 pounds per square inch. The film of oil between the shaft and bearing was .003 of an inch thick. Large 5-foot pipes circulated cold water from the Bay for the condensers.

We then came to four large engine-generators made by the Union Iron Works. The revolving wheels are 28 feet in diameter and are supported by a 24" shaft. These were run by triple expansion engines, but were idle at the time we were there.

Standing by the Giant Gas-Holder

We then went outside to see the largest gas tank, but one, on the Pacific Coast. It is considerably higher than the St. Francis Hotel, and holds 5,000,000 cubic feet of gas. Our next visit was to the boiler room which contained the 27 large boilers. Of these 9 were needed to furnish steam for the monster turbine. The pumping station down by the bay was now visited. Here were five centrifugal pumps, direct connected to electric motors. At the time of our visit only two were running. The capacity of the entire group of pumps is 120,000 gallons per minute. Despite the fact that there was so much work being done by the pumps there was hardly any noise. Near the door was an air pump for creating a vacuum for drawing the water up into the centrifugal pumps when starting.

On our return to the office, we passed the building adjoining the engine room in which were located the transformers. These were placed outside for safety in case of fire.

Altogether we had a most enjoyable visit which will linger in our memories for a long time to come.

By PROFESSOR A. L. JORDAN.

(Of Polytechnic High School, who accompanied the students on their visit.)

In the foregoing description, the boys have told only a few of the facts and figures, and have described only a little of the assemblage of marvels in a large electric power-station.

How much more impressive is such a visit when we learn, that this is but one of the company's many plants, most of them, the hydro-electrics, being far away in the mountains. In imagination we can see the imprisoned water rushing from the penstock down through the pressure pipe, propelling the water-wheels. We trace the electric current from the dynamos out along the transmission lines to the distant city. Thus by connecting the various plants by a network of wires a kind of "power-reservoir" is made available. How flexible the system! And yet, how difficult to realize the great effort, through years of development, which has made such perfection, ease of operation and reliability possible. Who are the men who have done and are doing this? First, let us not forget the faithful employees, the men on the shift; back of them, the engineers who planned the station, then, the designers of its marvelous machinery; farther back, the great pioneers: Parsons and Curtis, Westinghouse and Edison, Gramme and Siemens, Henry and Faraday.

In conclusion, we wish to express our appreciation of the courtesies shown us by the officials of the Company. Such visits are of the greatest benefit to students in presenting the practical application of their work in school.

"Each day it becomes more and more apparent that all questions in this country must be settled at the bar of public opinion. If our laws regulating large business concerns provide for proper and complete publicity, so that the labor of a concern will know what it is doing, so that the stockholders will know what is being done, and the public will have as much information as either, many of our present difficulties will disappear. In place of publicity being an element of weakness to a business concern, it will be an element of strength.

"If, as many of us believe, co-operation in business must take and is taking the place of ruinous competition; if it is better for capital, it must be better for consumer and better for labor. I believe that he who thinks the problem out, taking information from all sides, will be forced to the conclusion that the principle of co-operation must largely take the place of competition and that co-operation in its healthiest, most useful form, can be much more effectively practiced by great corporations than small companies or firms."

Geo. W. Perkins.

Marks of Industrial Fuel Progress

By JOHN B. REDD, Industrial Fuel Engineer.

J. B. Redd

There are several hundred different gas appliances on the market, each having its distinctive value, but to secure satisfactory results the proper appliance must be installed in each instance and constant attention given to see that good combustion is had at all times. Also, it is wise to instruct new operators in shop or factory on how to secure best results with the minimum consumption of gas.

The real work of the Industrial Department commences after the appliance has been installed. Accordingly, the business relations between members of this department and our customers is of the closest. In fact, we serve as employees both of the Gas Company and the user of any industrial fuel appliance.

We must have our customer's interest at heart, as his success means our success and a steady consumption of the product we have for sale. Knowing this, the customer as a rule is not reluctant to co-operate with us for the success of the particular appliance installed.

The Industrial Department maintains a corps of experienced engineers for the express purpose of advising with present users of fuel gas in obtaining a higher efficiency with their present equipment and recommending the installation of new industrial appliances where necessary. This department makes no charge to the consumer for designing and supervising the construction of special gas furnaces or burners, or for recommending changes in present equipment or on the installation of new appliances. We are in touch with every leading manufacturer of industrial fuel appliances and are in a position to recommend the proper kind for any particular work.

The following pictures of a few recent industrial fuel installations installed by the Industrial Department in San Francisco will aptly illustrate the possibilities of increasing the sale of gas.

Figure 1.-A, represents two bake-oven burners in operation. A clean, quick and economical method of heating bake ovens.

Figure 1-B, shows the interior of the Panhandle Bakery, 1598 Fulton Street, San Francisco, where all baking is done by gas fuel. There are two ovens here, one 11′ x 13′ and the other 9′ x 11′. One burner is shown in operation and the other can be seen over the shoulders of the men in the picture. Thirty bakeries have been equipped with these burners in San Francisco within the past twelve months, and the total average consumption of gas for these burners is 30,000 cubic feet per day, 1,000 cubic feet per day being the average amount of gas used by each burner. The price of wood in San Francisco varies from $10.00 to $12.00 per cord and about two cords per month is necessary to heat the average oven.

Figure 2, pictures the especially constructed fifteen horsepower gas fired boiler at the Illinois Pacific Glass Works which supplies steam to the paper factory and to the radiators for heating the office.

Figure 3, shows a Tempering Furnace, designed and constructed under the supervision of the Industrial Department for the Hoover Spring Company. This furnace is used for tempering automobile springs and a temperature of 1,500 degrees Fahr. is maintained at a cost of 24c per hour with gas at 80c per thousand cubic feet. Coke was previously used for this work and the cost of the fuel was somewhat higher, besides the extra cost of labor in handling. The Thermocouple with wires leading to the pyrometer is shown extended through the top of the furnace.

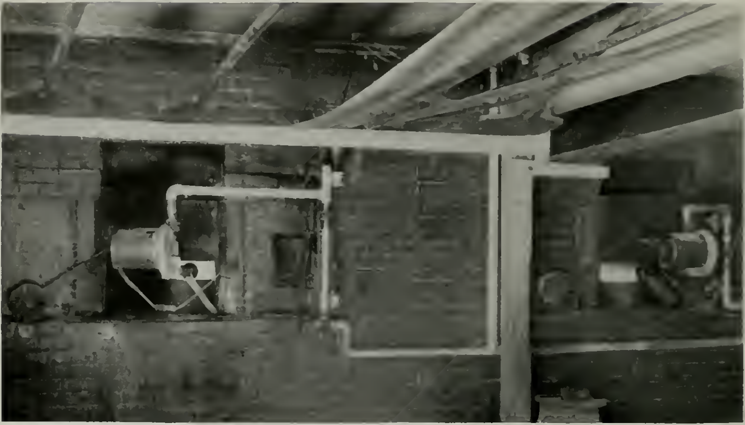


Fig. 1-A.

Figure 4. A smaller furnace at the Hoover Spring Company, which is used for heating the ends of the steel from which the springs are made. A positive pressure blower is shown on the top of this furnace which supplies the air at one pound pressure for both of the furnaces.

Figure 5. Rivet Heater at the Pacific Structural Iron Works. It is giving perfect satisfaction and operating at a less cost than when an oil furnace was used for similar work. One thousand cubic feet of gas per day is sufficient to keep this furnace going eight hours per day.

Fig. 1-B.

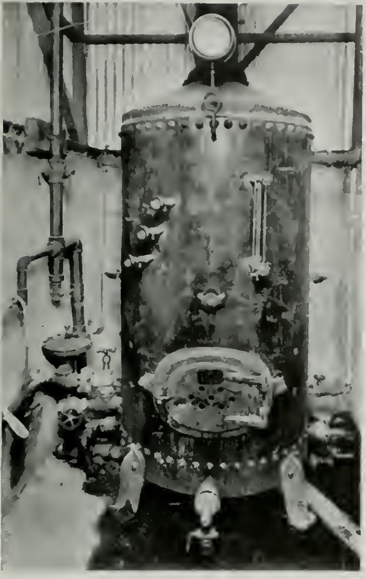


Fig. 2.

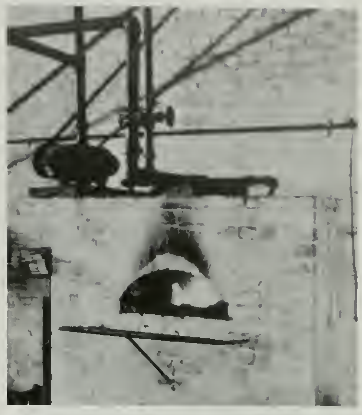


Fig. 4.

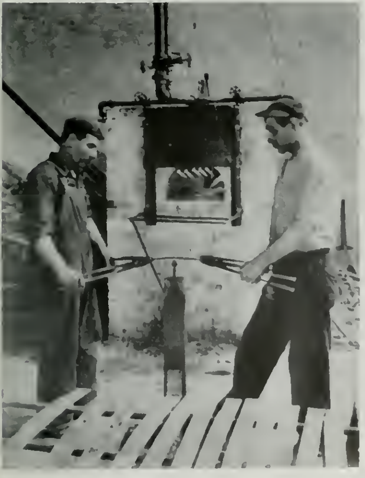


Fig. 3.

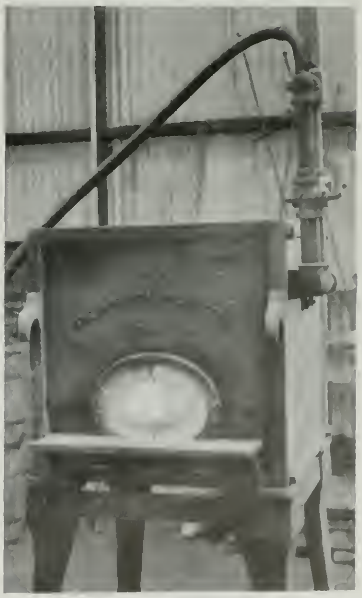


Fig. 5.

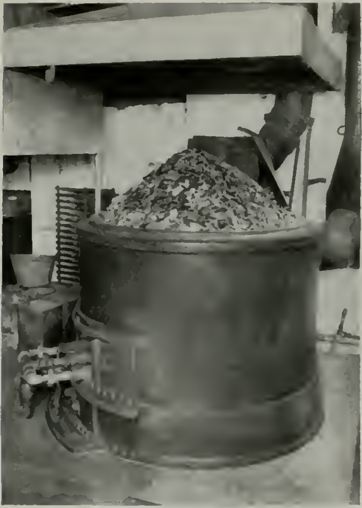


Fig. 6.

Figure 6. Four-ton soft metal melting furnace at the San Francisco Examiner. This furnace was built with the purpose of using hard fuel; but gas burners were installed about six months ago, and the results have been highly satisfactory. This is a combination atmospheric and blast burner, the burner being so arranged that when the blast is shut off the center burners will continue to burn as an atmospheric burner.

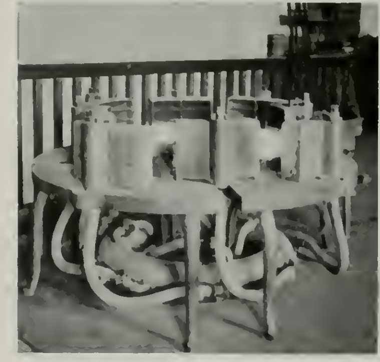


Fig. 7.

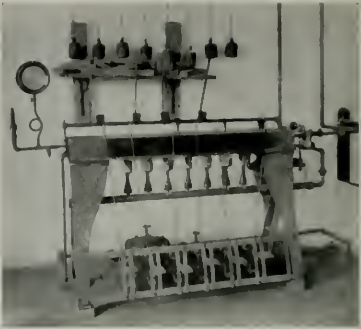


Fig. 8.

Figure 7. Tire Heater, for heating the rims of automobile wheels, in use by the Firestone Tire and Rubber Company. The rims are heated before being removed from the wheel and also when they are ready to be put on again.

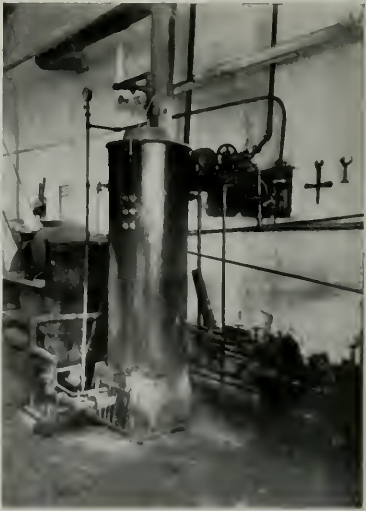


Fig. 9.

Figure 8. Steam Table, for curing rubber in the process of patching inner rubber tubes for automobile tires.

Figure 9. Seven horsepower Gas Fired Steam Boiler, in use by Coffin-Reddington and Company. Supplies steam for boiling purposes and also to a water still.

Figure 10. China Kiln for firing hand-painted China at Samishes' Studio. The oil burner is shown out of commission and lying on the floor, its place being taken by a gas burner.

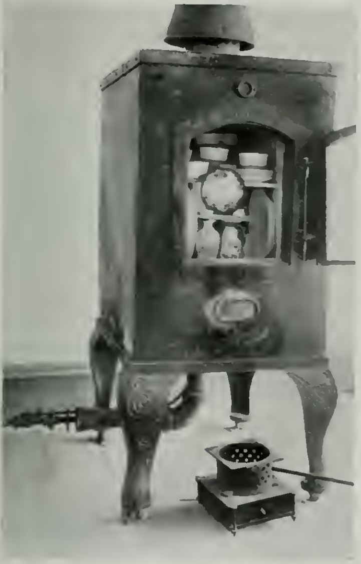


Fig. 10.

Figure 11. Atmospheric Annealing Furnace, designed and constructed by the Industrial Department for the Eastern Bed Manufacturing Company, is used for annealing brass tubes in the manufacture of beds. Two minutes is sufficient time for annealing each end of the tube.

Many other interesting installations have been made by this Department and we are glad at all times to advise with prospective users of fuel in solving their heating problems.

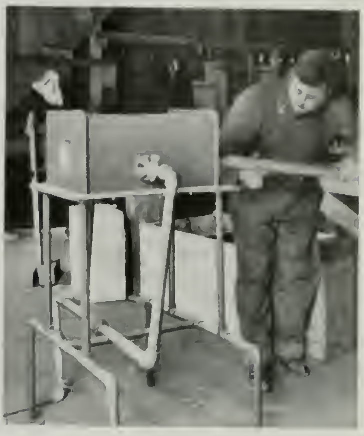


Fig. 11.

The Department has moved its headquarters from Room 310 in the company's main office building at 445 Sutter Street, to the building across the street formerly occupied by the Metropolitan Light and Power Company at No. 422. There is always on hand a staff of competent engineers who may be interviewed either at headquarters, or, by special request, at the consumers' premises. All that is needed is to telephone and let us know.

Our engineers are ready at all times to make things easy for the consumer by demonstrating perfect combustion on the appliances now in use or giving expert advice as to changes in equipment. The superiority of gas over all other fuels for industrial purposes can be made clear without any difficulty. The saving of expense alone is a consideration that commends itself to business men, and once this has become impressed upon their minds, it goes without saying that, as business men, they will lose no time in calling for the necessary installations.

Portland Convention a Success

By S. J. LISBERGER, Engineer Electric Distribution.

S. J. Lisberger

The annual Pacific Coast convention of the American Institute of Electrical Engineers was held at Portland, Oregon, April 16th to 20th, and was a most interesting experience for all who attended. At the convention headquarters, the Multnomah Hotel, ample provision was made for registration and meetings. Mr. S. G. McMeen, of the Portland Section, made the address of welcome, introducing Mr. Gano Dunn, of New York, President of the American Institute of Electrical Engineers. Past Secretary Ralph W. Pope, now Honorary Secretary of the Institute, was a delegate from the New York Section.

On the opening day interesting papers were presented on the subjects of Street Lighting and Irrigation. In the evening the Portland Section gave a dinner to the visiting members and their ladies, at which speeches were made by Toastmaster McMeen, President Dunn, Mr. Babcock, and others.

At the Wednesday morning meeting several papers were presented on the subject of Telegraphy. Wednesday afternoon the visitors were taken for a boat trip on the Willamette River, viewing the harbor of Portland and stopping en route at the "L" Street generating plant of the Portland Light and Power Company. The trip was continued up the Willamette River to Oregon City. The visitors were enjoying the trip immensely when all felt a slight jar and heard a grating sound. Word came from below that the ship was on the rocks. In making a sharp

The Clackamas rushing over the Spillway at River Mill

The Island submerged by water above the Dam

turn in the river the current had caught the boat, and before the helmsman could right her the mischief was done. There were pleasant prospects of one hundred people spending the night on board a boat with birth accommodations for perhaps twenty. However, a gasoline launch sighted the distressed vessel, and all were taken ashore safely, the women and children going first. Fortunately the scene of the wreck was very near a car line, and all were landed safely at Portland, hungry but none the worse for wear.

Thursday was devoted entirely to the convention meeting. Mr. P. M. Downing, of the Pacific Gas and Electric Company, presided at the morning session. In the afternoon the writer read a paper, in the preparation of which Mr. C. J. Wilson had collaborated, on the subject of "Alternating Current Systems of Underground Distribution." On the evening of April 18th, Mr. A. H. Babcock gave a talk descriptive of the electrification of the Southern Pacific Oakland suburban system, which talk was illustrated with many excellent lantern slides. As this was the last official meeting, resolutions of thanks were tendered to the Portland Section by the visiting members for the many courtesies extended them. Before adjourning, the Portland Section presented Mr. Gano Dunn with a loving cup in commemoration of his visit to the Pacific Coast.

On Friday the visitors were taken on a trip up the Clackamas River to the latest development of the Portland Light and Power Company, the River Mill plant. This plant has an installed capacity of 15,000 kilowatts, the most notable feature of the plant being a new type of hollow concrete dam. The next point of interest up the river was the old Cazadero plant, which plant has lately been almost entirely remodeled and rebuilt. Lunch was served at Estacada, the return trip being made to Portland in the late afternoon.

Before adjourning the representatives of the various Pacific Coast Sections met in session and selected Vancouver, B. C., as

Building an H. T. Tower on the side of a hill the next meeting place for a Pacific Coast Convention in 1913.

Harking back to our trip to the River Mill dam, the following description appeared in a recent issue of the "Portland Carman":

"Some idea of the magnitude of this great piece of work may be gathered when it is learned that the dam is 150 feet in width at the base. It consists of a series of parallel supporting walls called buttresses, placed 18 feet apart on centers and built in the general direction of the stream. The deck or upstream face is formed of concrete slabs, heavily reinforced with steel bars, spanning the space between and supported by the buttress walls. The thickness of the deck slabs varies from 48 inches at the base to 20 inches at the top or crest, and is built on a 45-degree slope. About 400 feet of the dam is occupied by the spillway section, over which the water flows when in excess of the quantity required for the wheels, as well as providing for the flow during flood periods. The bulkhead section, through which pass the penstocks conveying the water to the turbine wheels, is 15 feet higher than the spillway and is designed to protect the power station, situated below, from any possible overflow that might occur.

"The power house is built contiguous to the dam and is 173 feet long and 60 wide. It is designed to accommodate five units, each unit consisting of a Victor Francis turbine developing 6,000 horsepower, and a generator of 3,300-kilowatt capacity. Only three units are to be installed at the present, but ultimately with the remaining two in place, the full capacity of the plant will be 30,000 horsepower.

A view of the Clackamas before the Dam was built. The island in the center was nearly all blasted away

"For the handling of the materials used in the construction two cableways, each with a span of 1,000 feet, were suspended from towers located at each end of the dam, so situated that all parts of the work could be reached thereby. The cables were of steel, 2½ inches in diameter, with a carrying capacity of ten tons. In addition, the construction plant comprised a full equipment of derricks, pumps and necessary car service to facilitate the handling of the excavated material, as well as that which entered into the permanent structure.

A conception of the size of the work can be obtained from the fact that for building the coffer dams and forms for concrete over three million feet of lumber were used, and a carpenter force of two hundred men was constantly employed on this class of work; 55,000 cubic yards of concrete and 1,300 tons of steel enter into the construction, and the total force employed averaged 700 men.

"The two years preceding completion were fraught with much labor and the expenditure of vast sums of money. To build across a deep canyon, in which a rugged mountain stream rushes, a huge concrete dam 686 feet in width between abutments, is no small undertaking. It required the marshalling of engineers, expert electricians, an army of laborers and thousands of tons of material. Added to the ordinary construction work of this character were the unique engineering problems of the hollow type of dam. The peculiarity of this feature rested not in the fact that the dam was hollow—for small hollow dams have been built before—but in the size of the proposed dam. It is 81 feet in height, and in that respect exceeds all other dams of its type in the world.

"Construction work was commenced June 1, 1910, and it was on November 7th, 1911—just 17 months and 11 days—that President Josselyn, with Ogden Mills, one of the largest stockholders, General Manager F. W. Hild, Traffic Manager F. D. Hunt, and General Superintendent O. B. Coldwell, as his guests, witnessed the first movement of a turbine wheel at the River Mill dam. For some time previous, the water had been gathering in quantity so as to reach the crest of the dam. It was necessary for the stream to back up two miles, almost reaching the upper dam at Cazadero. When the water began flowing through the penstocks the engineers in charge of the power house which, by the way, is enclosed in the hollow space within the dam, turned the water into the turbine wheel, and the first movement of the machinery took place while President Josselyn and his guests were in the power house. It was really a momentous event. The moment which had been looked forward to for two long years had now arrived. President Josselyn was heartily congratulated by those about him for the successful culmination of the achievement of the engineering force."

IN MEMORIAM—HINSDILL PARSONS

WITH deep regret we learn of the untimely death of Mr. Hinsdill Parsons, Vice-President and General Counsel of the General Electric Company, who was killed in an automobile accident in Albany, New York, on the afternoon of Sunday, April 28th.

Although but forty-eight years of age, Mr. Parsons had shown himself to be one of the ablest corporation lawyers in the country. For nearly twelve years he had charge of the Law Department of the General Electric Company, and his able advice helped to solve many perplexing legal problems.

In his busy life he was prominent for the active part he took in many development enterprises. He was responsible, in a great measure, for the success of the Schenectady Railway Company, the Schenectady Illuminating Company and the Mohawk Gas Company, being president of the two last-named companies at the time of his death. He was a director of the Electric Bond and Share Company, The Washington Water Power Company and the Schenectady Power Company.

After the collapse of the Knickerbocker Trust Company in the panic of 1907, Mr. Parsons took a prominent part in the work of its rehabilitation, and later became one of its directors.

Mr. Parsons has a host of friends and admirers among the leading men of the legal and electric professions of the country.

And Now for a Tennis Tournament!

By EDWIN A. ROGERS, O. & M. Department, Steam Section.

E. A. Rogers

During July and August of last year a few enthusiastic tennis players in the company's employ, organized a tournament. The San Francisco branch of A. J. Spaulding & Co. donated a cup to be played for, with the condition that it should become the personal property of any member of the company winning it three times.

Thirty-two players signed up to try for the trophy, and drawings were held to determine the first round matches. As the only available courts were those in Golden Gate Park, it was decided to play the matches there. This arrangement did not work out very well, as there is a ruling in the Park that courts cannot be held for singles when people are waiting for doubles. As a result, there were many delays at first, and more than half of those entered in the tournament defaulted in the first round. After this round had been played, several defaults in the second and third rounds brought the play very quickly to the finals. In this match E. E. Dodge, of the Construction Department, met E. M. Szczepanski, of the O. & M. Department. Dodge, who was the more experienced player, had little difficulty in winning the match and the cup.

This year a new plan is to be tried in handling the tournament, which will put the players on a more even basis and encourage the less experienced ones to enter. Handicaps will be given, determined as far as possible from the results of the last tournament; it being the intention to have a committee, approved by those entered in the tournament, to do the handicapping.

With the idea of possibly forming a permanent organization, a meeting will soon be held for those interested in tennis, and the tournament started even if no organization is effected.

As some of the players are not familiar with counting a handicap score, it is to be hoped that a court may be found where all those entered can get together for two or three Sundays and the tournament run off under the direction of the committee. A small entrance fee will be charged, to pay for the balls, but this is the only expense to be incurred. If it is possible to obtain another trophy a doubles tournament may be held, which should prove of considerable interest, as it will probably be an interdepartment affair. This revival of interest in tennis among the Company's employes bids fair to furnish plenty of healthful amusement, in addition to helping out the "Pacific Service" idea of get-together.

The scores for the third round, semi-finals and finals for the last tournament were as follows:

THIRD ROUND

Burling beat Henley	9—7 & 8—6
Szczepanski beat Crowley	6—0 & 6—0
Dodge beat Delany	6—0 & 6—0
Steele beat Rogers	12—10 & 6—3

SEMI FINALS

Szczepanski beat Burling	6—1	6—1
Dodge beat Steele	6—2	6—1

FINALS

Dodge beat Szczepanski	6—1	6—0

Here's Baseball Up to Date!

THE ball club at the Naval Training Station on Goat Island was handed a 5-to-1 trouncing Saturday, April 13th. Our victory was due principally to Scanlon's pitching and "Duckey" Swan's timely hitting. The former struck out eight recruits and let them down with only three hits; while the latter, on two occasions, hit safely with runners on second and third, driving in four of our five runs. He also worked the hidden-ball trick again after one of the sailors had led off with a single. Gilhooley played a great game at third base, handling seven hard chances. The team played errorless ball.

The day following our naval victory we played our first out-of-town game and lost to the fast Burlingame team, 6 to 0. Several unearned runs tallied because of poor infielding. Only four hits were secured off "Southpaw" Benham. The B'lingum bunch got eight bingles and three bases on balls. Feeney, who pitched for us, hit two batsmen.

Sunday, April 21st, we made a good showing against the San Rafael "Regulars" although we lost out, the final score being 8 to 6. "Jim" Feeney's pitching showed a big improvement over the previous Sunday's game down the peninsula. San Rafael's hard-hitting left fielder, "Happy" Hogan, is an employe of this company, and we can blame him almost as much as "Lefty" Johnson, ex-Coast League twirler, for our sad home-coming. (Not wishing you any hard luck, "Hap", but if the Company team should play there again, we hope you have the measles; or worse yet, that Wallace Foster makes you work that Sunday.)

(No fun writing up the games we lose! Here's another one!) The same thing happened again Saturday, May 11th, and this time the Pacific Telephone and Telegraph Company slipped us a 6-to-4 walloping. Our regular second baseman and shortstop were missing, which weakened our line-up considerably. That diamond certainly looked phoney, all right. (Don't boot this one!)

"Losing Lou" Melbourne, who has had his baseball office in the basement the past month, consoled his players by stating that even the Oakland team lost a game once in awhile, and that our record of seven games won out of ten played gives us a better standing than most clubs.

Do You Know

That Scanlon *almost* played in a league? Fact! He was signed by the La Junta team in Colorado State League, but that organization blew up without playing a game. Haw! Haw!

The Epworth League is strong enough for you, Charlie.

That Fitzhenry, our big first sacker, played one game last season with the Los Angeles team? The one meal he got in the big league must have caused indigestion.

That Joe Wrinkle, our center fielder, actually refused a suit of clothes as a Christmas gift? He played all last season with the "Barney Frankels," and as a token of appreciation of his services, Barney wanted to present him with a "15-buck special," but Joe thought it wouldn't look good with a wrinkle in it.

That before this number comes out we shall have either won or lost against the Union Trust Company's team? Also, that we have a return match with the Telephone Company's nine scheduled for Saturday, May 25th? Also, that we are open for engagements to any and all who think they can take our measure, and that whatever happens we think we can render a good account of ourselves?

M. B. MENSING.

"Scribner's" on "Pacific Service"

In the current number of "Scribner's Magazine appears a series of articles on Power Plants. In one of these Mr. David B. Rushmore writes of "Water Power in Industrial Life," and in discussing the hydro-electric systems of the United States says:

"OF all the great transmission systems in this or any other country, however, that centering around San Francisco stands pre-eminent in the number of stations feeding into the one system, and in the very large number of miles of the high tension transmission. The high cost of fuel in this part of the country brought about the very early development of some of the water powers, and for a long time the history of electric power transmission in the United States was largely made up of that of the companies centering around San Francisco. The developments which started with the Nevada County and the Yuba River plants changed later into the Bay Counties System; then into the California Gas and Electric Corporation, and now, with the absorption of the local lighting company in San Francisco, into the great corporation known as the Pacific Gas and Electric Company, which is the greatest hydro-electric transmission system in existence. On this system will be found the mile-stones which marked the progress of the development of the art, and it is interesting to note that in many of the stations the inductor alternator, now a practically obsolete type of machine in this country, is still to be found.

"The Pacific Gas and Electric Company, which is the best illustration of a large transmission system, has installed in water power plants a capacity of 93,000 horsepower, and in steam plants about 96,000 horsepower on the entire system. The water storage of these plants for both power and irrigation would be sufficient to supply the city of San Francisco with water for two years. There are over 550 miles of ditches and flumes and nearly 13 miles of pipe-line. Fifty-one electric generators supply the energy delivered to the overhead wires, being driven by water-wheels, steam turbines, and engines. One hundred and seventy-eight sub-stations have over 200,000 horsepower in transformers which are connected to over 1,000 miles of high voltage power transmission lines, and over 1,800 miles of distributing lines. Such a representative system, founded primarily on water-power development, plays a part of first importance in the life of this great community, and may be said to be one of the foundations on which the marvelous commercial activities of the State depend."

"Pacific Service" as a Home Industry

Thursday, April 18th, at the regular luncheon of the Home Industry League, Mr. H. P. Pitts, representing the Industrial Engineering Department of the Pacific Gas and Electric Company, gave a very interesting address on the work accomplished by his department in the utilization of gas for various manufacturing purposes.

There was a large attendance, mainly representatives of manufacturing industries in San Francisco and the vicinity, and the address was listened to with the greatest possible interest.

This work of the Industrial Department is most important, both to the Company and to the consumer, and from time to time, as in the past, detailed accounts of the work will appear in the magazine. Mr. Pitts' talk was illustrated by lantern slides depicting the various uses of gas for bake ovens, tempering furnaces, etc. The company furnished appropriate menus for the occasion, and Manager Geo. C. Holberton of the San Francisco District gave some figures which will bear repeating here:

In the San Francisco District alone during the year 1911 the manufacture of gas amounted to 3,815,611,200 cubic feet. This amount would be sufficient to keep one lamp burning all night for 238,476 years, or to light the streets of San Francisco for 36⅓ years. The output of electricity amounted to 121,228,497 horsepower.

Now to do this the Company employed 1,535 men and women, and paid out $1,350,372.50 in wages. It supplied 122,355 consumers daily and used daily 113 automobiles and trucks and 85 horses and wagons. The purchase of oil during the year for generating gas and electricity amounted to 1,144,236 barrels. There was paid out in taxes $226,713.58, and to local merchants for supplies $2,691,574.08. The equipment for lighting the streets of San Francisco alone consisted of 8,653 gas and electric lamps.

Electric Light Men, Get Together!

President Geo. C. Holberton of the Electrical Development League sends the following message anent the great gathering of Electric Light men to be held at Seattle, June 10th—15th:

The National Electric Light Association holds its annual convention this year at Seattle.

We hope that the electrical fraternity in San Francisco will send a large delegation. It is not often that a convention of such a large and important body is held on the Pacific Coast, and we should all make an effort to make it a great success. In addition to this, we certainly hope that the convention of this and many other associations will be held in San Francisco in 1915, and the surest way to encourage our friends in the North to help us to this end, is to lend them every possible support to make this year's convention a success.

The Electrical Development League, representing, as it does, so many of the electrical branches of the industry, is taking a great interest in this matter, and is endeavoring to arrange for a special train, leaving San Francisco in the evening and arriving at Seattle on the morning the convention convenes. Already the League has been promised support from a great many people, who, with their families, signify their intention of availing themselves of this opportunity. Entertainment will be provided, and altogether it will be a most delightful trip.

We hope that our friends in the South will send a large delegation which will join this train in San Francisco.

Mr. Strong, Secretary of the Electrical Development League, is looking after the details, and we trust that all who are going to the convention will avail themselves of this opportunity, and notify Mr. Strong, care of the Journal of Electricity, Power and Gas, Rialto Building, as to how many tickets they desire.

Full information as to fares, both railroad and Pullman, is being sent out by Mr. Strong.

Very truly yours,
Geo. C. Holberton.

Governor Foss of Massachusetts signing his message to the Legislature of his State in behalf of the Panama-Pacific Exposition.

Noting Progress of the World's Fair

Work of Construction Started on the Harbor View Site—Buildings Being Removed and Water Lots Filled In

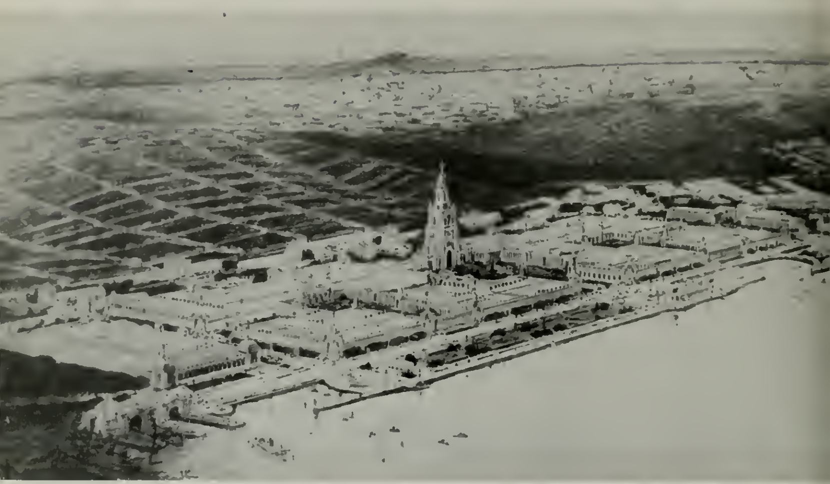
There was joy in the land one day last month when, through the medium of the California press, the announcement was sent out that a start had been made in the work of constructing the great International Exposition that will celebrate the completion of the world's greatest engineering enterprise, the Panama Canal.

It may be expected that from now on there will be "something doing" all the time. So, starting with the present number, it is proposed that the Pacific Gas and Electric magazine shall keep its readers posted on the progress of events. A review of each month's advance toward the completion of California's gigantic enterprise, we feel, will be appreciated far and wide by loyal citizens who look to San Francisco to do honor to herself, her State, and her country.—Editor Pacific Gas and Electric Magazine.

THE great Panama-Pacific International Exposition to be held in San Francisco in 1915 is preparing to assume visible form. Ground has been broken at Harbor View and the work of construction actually started.

In preparing the site for Exposition purposes there were blocks upon blocks of buildings to be removed and some seventy-one acres of overflow and swamp lands to be filled in. All that is under way at the present time.

President Moore and Director of Works Connick starting operations at Harbor View.



Bird's-eye view of the Panama-Pacific Expo

The ceremony of starting the filling-in took place a month ago and was witnessed by a large concourse of spectators from the pier at the foot of Webster Street. President Chas. C. Moore and Director of Works Harris D. H. Connick of the Exposition Company were the chief actors in the little play, and it was President Moore's hand that pulled the lever which started the pumping of sand from the Bay that in a very few months' time will have transformed into terra firma—these water lots that for years have lain waste upon their owners' hands. The 2,000 horse-power dredger, "John McMullen," the property of the San Francisco Bridge Company, is being used for filling in the land. It is pumping sand from the bay through a line of pipe half a mile long and is expected to take five months to complete its labors. The sand is sucked up in the bay at a depth of fifty feet and the amount necessary for the work of construction is estimated at 1,500,000 cubic yards.

The other day an auction sale was held of the houses occupying locations upon the Harbor View site. Those that have not been pulled down have been removed to other sections of the city. On the land they occupied will arise magnificent exposition buildings.

The organization of the Exposition Company is about complete. Frederick J. V. Skiff, the famous exposition expert, who has been placed in charge of the Department of Foreign and Domestic Participation, is now in Europe. Before he left he promulgated general rules and regulations which will be of interest to all who have the welfare of this great enterprise at heart.

The Exposition will open on February 20th, 1915, and close December 4th of the same year. The Exposition site proper will cover 625 acres and will have a frontage upon the bay, near the Golden Gate of 15,000 feet. This, in the opinion of the management, will be ample space in which to locate the main features of the Exposition, and its judgment in this respect is borne out by the history of expositions that have gone before. The main exhibition palaces will be

it will develop on the site at Harbor View

opened to visitors at 9 a. m. each day and will be closed at the hour of sunset, the Art Palace being the sole exception to this rule. The price of admission will be 50 cents for individuals over the age of 12 years, and 25 cents for children between the ages of 5 and 12.

The administrative branches of the executive divisions and departments of the Exposition are under the authority of President Moore. The members of the executive committee and the comptroller of the company constitute the president's administration cabinet. His executive staff consists of the following officers:

Director in Chief of Foreign and Domestic Participation; Director of Exhibits; Director of Exploitation; Director of Works; Director of Concessions and Admissions. Under these officers subordinate departments for the supervision of exhibits, construction and maintenance are provided for, each department having its individual head or chief.

For the purpose of the orderly and systematic installation of exhibits and their review by the jury of awards, a classification has been adopted divided into a number of departments, each of which is again divided into groups and subidivded into classes. Under this classification the exposition will be constructed, the installation perfected and the system of awards conducted. In conformity therewith the following exhibit departments have been created:

Department A, Fine Arts; Department B, Education; Department C, Social Economy; Department D, Liberal Arts; Department E, Manufactures; Department F, Machinery; Department G, Transportation; Department H, Agriculture; Department I, Livestock; Department K, Horticulture; Department L, Mines and Metallurgy; Department M, Discoveries and Maritime Development of the Pacific area.

All applications for sites for buildings and outdoor exhibits must be filed on or before June1, 1914.

Outdoor horticultural and agricultural growing exhibits must be installed at such times before the opening of the exposition as is necessary to insure their development within the proper season covered by the exposition period; certain trees must, in accordance with this rule, be started not later than August 1, 1912. Machinery and mechanical appliances intended for exhibition must be in operation August 15, 1914. For machinery and mechanical appliances not intended for exhibition in operation October 1, 1914.

All communications relating to the exposition must be addressed to the president of the Panama-Pacific International Exposition, San Francisco. All packages containing exhibits must be addressed to the president of the exposition.

An official catalogue of all exhibits will be published in English by the exposition. Foreign governments and States and Territories of the United States, making a collective exhibit, may publish separate catalogues of their own exhibits when recommended by the chief of the department and approved by the director-in-chief. The sale of catalogues is reserved exclusively by the exposition.

The system of awards will be competitive. The merit of exhibits, as determined by the jury of awards, will be manifested by the issuance of diplomas, which will be divided into five classes—a grand prize, a gold medal, a silver medal, a bronze medal and an honorable mention (without medal).

A chairman of the group jury will be elected by his colleagues in each group. This chairman will become, by right of his position, a member of the department jury, which department jury will in turn elect its chairman, who shall thereupon become a member of the superior jury.

The honorary president of the superior jury will be the president of the exposition. The president of the superior jury will be the director-in-chief of foreign and domestic participation. There will be three vice-presidents appointed by the president of the exposition. The first vice-president will represent Europe, the second vice-president South and Central America and the third vice-president the Orient.

Active interest in the Exposition is now being manifested all over this country and abroad. Ten States of the Union have already selected their sites for State buildings and within the next few months it is expected that Governors and Commissions from other States will come to San Francisco for the same purpose. Governor Foss of Massachusetts in his May day message to the legislature of his State said:

"Boston and San Francisco with the use of the Panama Canal will occupy exceptionally close strategic positions with respect to American industries, on the one hand, and the distribution of products of these industries, on the other, consequently the opportunity now afforded to advance our interests in conjunction with San Francisco should not be overlooked or neglected."

The World's Fair Commission recently appointed by President Taft is already in Europe fulfilling its mission of visiting the capitals of the older world and securing active participation of foreign governments. The Commission is composed of John Hays Hammond, General Clarence B. Edwards, Admiral Sidney A. Staunton, R. B. Hale and Wm. T. Sesnon.

Accompanying all this news of progress is a most encouraging report from Allan Pollok, the exposition comptroller, who states:

"Collections on subscriptions have been surprisingly satisfactory, amounting in all to $1,707,639.66, or 28.15% of the total amount subscribed; this despite the fact that no extra means have been taken to secure payments on assessments falling due, and that, notwithstanding the extraordinary amount of preliminary work being done, but little physical construction has been commenced."

PERSONALS

From the Marin District comes intelligence of a new scheme which is working wonders in making the Company's office at San Rafael a perfect model of neatness.

Cashier Ridgway conceived the idea of having all employes sign an agreement by which each subjected himself to a fine of ten cents for each time that he left a book open on his desk, or failed to return a book to its place after use, or allowed scraps of paper to accumulate about his desk, or either committed or permitted any act of untidiness whatever. It less than two weeks the result was conspicuous. All books seemed to be in their places; all catalogues were properly filed away; fixtures were free of dust and not a scrap of paper was to be seen anywhere. The entire office force appeared to take pride in keeping things neat and orderly, and it is of record that two of the men took so much interest in the new order of things that they put in several evenings and one or two Sundays in painting some of the fixtures and a portion of the floor.

This is something worth while and which may well commend itself to the attention of all district offices over the entire system.

Chief Engineer P. M. Downing of the Hydro-Electric Section, Consulting Engineer F. G. Baum, and Manager E. B. Henley of the Land Department, have returned from a trip of inspection that extended from San Francisco to Grass Valley. They went by automobile and their route took them through Richmond, Vallejo, Suisun, Davis, Woodland, Colusa and Marysville, returning through Grass Valley and Sacramento by way of Auburn and Newcastle.

W. L. Heino, of the Commercial Department, Oakland District, wears a glad smile these days. A little daughter arrived at his home April 27th.

A new Wilbreham-Green exhauster is to be installed in Fresno. It will be connected to the relief holder by a 16-inch line. A garden has been planted in the holder yard. Walks have been plotted and bordered with roses. Many climbing vines have been planted near the fences. A very attractive spot has been made out of what was once a dumping ground.

The stork has been visiting the Collection Department. C. R. Cathcart is the proud father of a girl baby, while Alfred Silvester has added a little boy to his family belongings.

Under the name and style of the Garcia Club, the organization of employes of the Fresno District office appears to be growing strong. There were two well-attended meetings last month. The first was purely social in character, the feature of attraction being a player piano demonstrated by a local music company. At the second meeting W. R. Alsop read a paper on the laying of low-pressure gas mains, which was followed by a general discussion. There has been one meeting this month already, at which Earl Bishop explained the gas meter. Fresno certainly sets the pace.

The Suggestion Bureau, the inauguration of which was announced in the April number of the magazine, is meeting with attention from all parts of the Company's system. It is a move in the right direction and should be productive of good results. There is always room for improvement in the best regulated households. Come along with your suggestions!

Pacific Gas and Electric Magazine

PUBLISHED IN THE INTEREST OF ALL THE EMPLOYEES
OF THE PACIFIC GAS AND ELECTRIC COMPANY

JOHN A. BRITTON - - - - EDITOR-IN-CHIEF
FREDERICK S. MYRTLE - - MANAGING EDITOR
A. F. HOCKENBEAMER - - BUSINESS MANAGER

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The Pacific Gas and Electric Company desires to serve its patrons in the best possible manner. Any consumer not satisfied with his service will confer a favor upon the management by taking the matter up with the district office.

VOL. III MAY, 1912 No. 12

EDITORIAL

IN THE COURSE OF AN ADDRESS DELIVERED at Philadelphia on the 19th of April last, the occasion being the celebration of the centenary of the use of gas as an illuminant, the Hon. George B. Cortelyou gave voice to the following sentiment:

"If there is one thing more than another that is a menace to industrial progress, I believe it is the untenable position assumed by some extremists who would limit the return allowed such corporations as those which are of the public utility class to a rate so low that it either barely equals the legal rate of interest or, taking into account the varying factors that must be considered in the case of each company, a rate that is practically but a fraction above confiscation. To induce original investment and development, to insure progress after establishment, to safeguard both the company and the community, a return not merely theoretically but actually fair and liberal must be permitted if the normal laws of trade are still in effect, and we believe that they are."

Mr. Cortelyou spoke upon the subject of "The Modern Public Utility Company—Its Relations to the Public and to the Municipality." His was not at all a one-sided address. He said, for instance:

"The relations of the company to the municipality should be characterized by integrity and efficiency of management and fair and impartial treatment of all who do business with it. In turn, when the public is fairly and efficiently served, that is, with the best service at the lowest rates compatible with a just estimate of their respective relations, the municipality should support and encourage the company. The public is less concerned with the precise rate it pays than it is with having thoroughly efficient service. If the company is honestly conducted and its affairs are given that degree of publicity which is proper and which is the public's due, it does not begrudge to the company adequate returns, nor will it yield to the screamings of the demagogue and the self-seeker when he misrepresents the facts or encourages unjust attacks.

"It should be remembered that when franchises were granted to the public utility companies they were granted with the idea that a service absolutely essential to the growth of the community was to be provided, and, it must also be remembered that in many cases those who obtained these privileges or franchises faced a serious risk in making their investment, that there was no assurance that an adequate return would be forthcoming for the money and energy expended in the building up of the service.

"A factor which the unthinking man should have brought to his notice when the supposed enormous profits accruing to lighting companies are discussed is the ratio between investment and gross income. Investigations show that the annual gas sales of many of the companies do not exceed $15 for each $100 invested. It must not be inferred from this that these companies make $15 per year on every $100 investment, but that their actual sales each year amount to but about one-seventh of the money invested. This would indicate an investment of $7 for each 1,000 feet of annual sales at $1 per

M approximately. In other lines of business it is expected to turn over the capital once, twice or three times a year, but here is a business in which millions are invested in which the capital is turned over only once in about seven years."

Mr. Cortelyou needs no introduction to the people of the United States. He is a public man and has held public office. He is eminently qualified to discuss in a fair and impartial, as well as an enlightened way the public service question. His remarks are well worthy of consideration. On the one side he insists upon the most absolute frankness and sincerity on the part of the public service corporation in its dealings with the municipality and the public; in return for which he urges an equal amount of sincerity and fairness on the part of those to whom the public service corporation is responsible.

In the current number of "Pacific Service," a monthly publication of world-wide circulation, there is an article by Mr. William G. Deacon upon this subject in which the following appears:

"More and more, the companies are coming to see the advantages to be gained by public discussion and explanation of their business affairs and their operating problems. In many recent instances full publicity has been given to facts and conditions that in years past would have been considered strictly of private concern to the officers and confidential employes of a company, and as a rule the companies that have taken this course have benefitted greatly in public sympathy and confidence.

"A very recent example of this policy is found in a pamphlet issued by the Pacific Gas and Electric Company of San Francisco late in March of the present year. This document is addressed to the Board of Supervisors of the city and county of San Francisco and, in its general nature, is an argument on the question of rates for gas and electricity. In it the company discusses its financial affairs in the most free and open manner, telling of its various needs for new capital for the last four years, the manner in which this capital was obtained, the terms under which the loans were negotiated and the purpose for which the money was used.

"The pamphlet as a whole is a convincing document and there can be no doubt as to its favorable effect on the public mind. It contains such information as is calculated to present the company's financial situation clearly before the public officers to whom the communication is addressed and the citizens of San Francisco generally. The dissemination of this information cannot fail to impress the business portion of the community, at least, and it is sure to bring about a better understanding between the company and the public."

This same subject was dealt with recently at one of the weekly luncheons of the Commonwealth Club in San Francisco. The powers and duties of the new State Commission appointed under the Public Utilities Act were discussed in explanatory fashion by Mr. Max Thelen, a member of the Commission and, also, its attorney. Mr. Thelen won golden opinions for the clear and concise manner in which he presented the case for the Commission to his hearers. He expressed the opinion that the regulation of the public utilities by a body such as that he represents will prove of the greatest advantage to all parties. "It will be better for the public utilities themselves, as well as for the people they serve," he said. In this the Commissioner echoed the overpowering public sentiment in favor of the centralization of authority, and there arose an instantaneous response from his audience when he declaimed: "We are prepared to do our duty, and shall not wince at criticism from the one side any more than we shall wince at criticism from the other."

Dr. A. H. Giannini, a member of the Board of Supervisors, spoke in similar vein.

Authorized Additions and Improvements

ANTIOCH DISTRICT

Eleven-kilovolt line has been extended to supply service to the B. F. Porter Estate and the California Fruit Canning Association.

COLUSA DISTRICT

Extension of 11-kilovolt line in Colusa County has been authorized, to take care of additional load.

CONTRA COSTA DISTRICT

Work has been commenced on the extension of three-phase lines to supply service in the Alhambra Valley.

MARYSVILLE DISTRICT

Work has been commenced on the changing of the 2,300-volt lines to 11-kilovolt lines in order to take care of increased load in Sutter County.

Arrangements are being made for placing the town of Lincoln upon a meter basis.

Reconstruction of the Wheatland distribution system has been commenced.

MARYSVILLE POWER DIVISION

A new street lighting system is being installed in the town of Lincoln, and lines in that town are being generally overhauled.

Eleven-kilovolt line has been extended to take on additional load near Grimes.

OAKLAND DISTRICT

In compliance with city ordinance, work has been commenced on the extension of underground system in District No. 6.

Extension of underground system has been commenced in order to supply service to the new Oakland Hotel.

REDWOOD DISTRICT

A new single-phase automatic regulator is being installed at Redwood substation.

SAN FRANCISCO DISTRICT

Four automobiles have been purchased for use in the Gas Mains Department.

SAN JOSE DISTRICT

A new automobile has been purchased for the use of the Superintendent of Electric Distribution.

Work has been commenced on the installation of a new street lighting system in College Park territory.

SAN JOSE POWER DIVISION

Substation has been constructed for furnishing service to the Niles Gravel, Sand and Rock Company, Niles, California.

Additional transformer capacity and automatic regulator has been installed at San Jose substation, to take care of 4,000-volt load.

SOLANO DISTRICT

Work has been commenced on the reconstruction of the distributing system at Suisun and Fairfield.

All flat rate consumers in this District are being placed on a meter basis.

STOCKTON POWER DIVISION

Eleven-kilovolt line has been extended from the Orwood substation to furnish pumping service to the McCabe Ranch.

Work has been commenced on the construction of 5½ miles of 11-kilovolt line in order to furnish pumping service to the Finck Ranch.

A new launch has been purchased for use on the San Joaquin River in and around Stockton.

STOCKTON WATER DISTRICT

A 1½-ton Reo truck has been purchased for use in this District.

A 14-inch cast-iron main is being laid from Pumping Station No. 1 to the center of business district, for the purpose of generally improving the service.

What the Press Has to Say

Will Develop More Power

Grass Valley Gets Wind of Company's Contemplated Hydro-Electric Construction Work on Bear River

An immense project, which is now occupying the undivided attention of Engineer Clifford and other engineers of the Pacific Gas and Electric Company and which is immense in magnitude, calls for the construction of a large power plant on Bear River in the vicinity of the high trestle of the Narrow Gauge railroad.

Although the project has been under contemplation for about eighteen months it is now nearing the point of consummation and it is probable that work will begin within the course of a few months. In a telephone communication with James H. Wise, assistant manager of the Pacific Gas and Electric Company, at San Francisco last night, the official corroborated the report that the project was being considered, but stated that plans were still in an immature state. Mr. Wise also admitted the engineers were recently in the vicinity of the location of the proposed power plant making preliminary surveys and securing other data to further the work.

PLANT WILL BE BUILT.

It is almost a certainty that the proposed plant will be constructed, but just how long it will be before actual work begins depends solely on the length of time necessary for the engineers to complete the plans.

When the new plant is constructed, it will be operated in conjunction with the other main plants of the company two of which, the Colgate plant and the Deer Creek plant, near Alta, are located within close range of this city. The other important plants of the company are the De Sabla plant in Butte County, Electra in Amador, Folsom, Newcastle and Centerville. All of the plants of the Pacific Gas and Electric Company are parallel and run into one big system. The Bear River plant will be constructed in the same manner so as to tie in with the other plants. The exact location has not been definitely decided upon.

TO DIVERT AMERICAN WATER.

The water to operate the new plant will be secured mainly from Bear River, although the company owns the large Towle System on the American River and the water from this system can be diverted into the channel of Bear River and by this means plenty of water will be obtainable.

Just what the size of the proposed plant will be has not been decided upon, but it will probably be as large as the Colgate plant which is of 18,000 kilowatt capacity. The Colgate is one of the main sources of power for the Pacific Gas and Electric Company and with a new plant on Bear River in operation it will greatly enlarge and better the company's distributive system.

The building of another plant near this city would be of great benefit in that a large number of men would be employed in the construction work and also a large number of men would be employed in operation of the plant.

Grass Valley (Cal.) *Union*, April 30, 1912.

Lamps for Marysville

The Marysville City Council has granted permission to the Pacific Gas and Electric Company to install 120 25-watt tungsten lamps in the arch at Third and D streets for the purpose of demonstrating to the city that the cost of lighting can be greatly reduced by use of proper lamps. These lights are to be used for a period of one month and are expected to show a saving of at least 30 per cent per month over the old carbon lamps.

Marysville (Cal.) *Democrat*, April 24, 1912.

Work of Survey Begun

GRASS VALLEY, April 29.—Engineers for the Pacific Gas and Electric Company arrived to day to make surveys for the reservoir and power plant on Bear River, near Nevada county's narrow gauge railroad building.

It was announced that the old Towles water system on the American River will be diverted into Bear River, and that the new plant will become an important station in the company's great system.

That a new company has been formed to take over the Colorado Midland's project of building a railroad from Marysville to this city became known here today.

C. E. Clinch admitted that he was interested in such a company, and that options had been obtained on the Colorado Midland right of way and terminals, and also on the electric line running from here to Nevada City.

San Francisco (Cal.) *Call*, April 30, 1912.

May Operate Trolleys

The Pacific Gas and Electric Company has amended its article of incorporation so that it will hereafter be permitted, under the provisions of its state charter, to engage in the operation of electric railroads.

In the county clerk's office there was filed today a copy of the amendment signed by President F. G. Drum and Secretary D. H. Foote.

The notice of change recites that the following is to be inserted in the articles, after paragraph XIII:

"To acquire by purchase or otherwise and to construct street railways and to engage in and conduct the business of operating street railways as a common carrier of passengers, freight and express matter for compensation and to otherwise acquire and dispose of all franchises which may be necessary or proper for the acquisition, construction, maintenance and operation of such street railways."

The resolution authorizing the amendment, it is recited, was passed at a meeting of stockholders held during the present month in the general offices of the company here.

San Francisco (Cal.) *Post*, April 29, 1912.

Manager Cooper Instructs

The Republican has secured an interview with H. M. Cooper, manager of the Pacific Gas and Electric Company's Placer County district which should be closely read by the people of Auburn:

"The past winter having been an unusually dry one we have been compelled at times to furnish water carrying more or less silt and sediment, in order that an adequate supply might be maintained for the city of Auburn.

"This condition brought up the discussion of the feasibility of a modern and adequate filtration system for domestic purposes.

"With that end in view the Auburn Chamber of Commerce at its regular meeting of Wednesday, March 6th, 1912, referred the matter to the Pacific Gas and Electric Company, with a request that they furnish the Chamber of Commerce with a report at their next meeting April 3rd.

"On that date Mr. H. C. Vensano, the Company's engineer, appeared before the Board giving a brief and instructive talk on matters pertaining to the proposed filtration system. Among some of the important features of Mr. Vensano's report was the statement that the city of Auburn was consuming on an average of 744 gallons per capita per day, which is a very excessive consumption as compared with similar cities in the State.

"The cost of a filtration plant of this capacity would be prohibitive and before any definite action in the matter could be taken it would be necessary to reduce the quantity of water which is now being furnished the city in order that proper data might be obtained as to the probable requirements and cost of a suitable plant.

"Mr. Vensano also stated that he had a preliminary estimate of a plant which would cost about $70,000, and would have a capacity of about 150 gallons per capita per day which he thought would be more than actually required basing his statement with reference to reports of other cities.

"After a general discussion of the subject Mr. Vensano stated that an employee of the company would visit each consumer, that additional data might be obtained as regards water usage, and in order to carry out the collection of this information we would request the co-operation of all concerned."

Auburn (Cal.) *Republican*, April 11, 1912.

Oakland Best Lighted City

Fact Admitted by Residents of Modern Athens and Nearby Cities

Oakland has the best lighted streets on the Pacific Coast. This is a fact which is admitted by residents of the other large cities in this section of the country, who have compared the nightly illumination of Oakland with that of their respective home places.

The advancement which Oakland has made in this respect, began several years ago, shortly after a law was passed by the Legislature providing that the residents in certain sections of cities might agree to tax themselves a certain rate for the purpose of supplying ornamental lights at night which were not furnished by the regular service of the municipality.

This bill was passed at the special instance of leading people of Los Angeles who wished to have special illumination in the heart of the city for which they were willing to pay. The people of the southern city were enthusiastic on the subject and the result was that there was a remarkable improvement in the lighting in the business district of Los Angeles, which had the effect of making her a great deal more attractive to visitors than she had been before.

Oakland, however, took up the matter and the taxpayers along the through lines of streets leading to the business district, supplied out of their own pockets the money for the electroliers while the city pays for the electricity used in the illumination. As a consequence all the main streets are flooded with light at night and this is increased by hundreds of illuminated business signs of merchants. Now the illumination is extending to the outlining with lighted bulbs of whole business blocks at night and the number of these is increasing from week to week. As a consequence, the illumination which strangers see in the sky at night when approaching the city is not a conflagration but the reflection of the thousands of lights which are burning in the streets for the accommodation of the people.

In the adjoining columns, The Enquirer herewith presents a few views of lighted streets and structures in this city at night, and these will be followed by others later, which will illustrate the great advancements which has been made in this direction.

Oakland (Cal) *Enquirer*, April 27, 1912.

Wiring for Wheatland

The Pacific Gas and Electric Company is making extensive improvements on the Wheatland lighting system; in fact is rebuilding the entire plant. When the work is concluded there will be a big improvement in service.

The trustees have entered into a contract with the electric company to maintain 27 16 candlepower Tungsten lights which will be placed across the center of the street. These lights will prove a big improvement over the old system and will light the streets up in good shape.

Wheatland (Cal.) *Four Corners*, April 26, 1912.

Oakley Ablaze With Light

Residents of Contra Costa Town Grateful to the Pacific Gas and Electric Company

Electric lights are ablaze in Oakley, thanks to the Pacific Gas and Electric Company, and the town is putting on some airs. There is every reason for this, for the people there showed by their votes Monday that they are entitled to a place among the most enlightened communities.

The Pacific Gas and Electric Company has sub-stations at Antioch and Pittsburg.

Since its acquisition of the local companies in Eastern Contra Costa, it has been putting into effect its policy of improvement and extension of the service in every direction.

On account of the almost virgin conditions, it has called for large expenditures of money, and much of the extension has been in the nature of pioneering.

The company has taken pains to make only such extensions as would be permanent in character, thus assuring the best service at the least cost.

Thousands of dollars are being spent in the work in these eastern sections, and the enterprise of the company is a big boost.

F. J. Southerland, Antioch manager of the Pacific Gas and Electric, is enthusiastic over the outlook. Mr. Southerland is a hustler, and he is pleasing his patrons because he is bending every energy to give a good service.

In Pittsburg, a Tungsten street lighting system has just been completed. There are 61 lights—one for every corner. Pittsburg is a progressive city. Fine streets, well lighted, is a mighty big advertisement.

The Pacific Gas and Electric is furnishing power to the California Paper and Board Mills, Columbia Steel Works, Johnson & Lanteri Shipyards, Diamond Brick Co., Diamond Milling Co., Redwood Lumber Co., California Fruit Canners' asparagus cannery at Pittsburg, Weeks' asparagus packing house at Antioch, Holland Brick Co. and the Golden Gate Brick Co. at Antioch, the Nelson Dairy at Pittsburg and many other important plants along the line.

Everybody in Oakley is taking juice and the town presents a dandy appearance. H. T. Samuels of Tracy and his force have been doing the wiring and installing of motors.

The Pacific Gas and Electric is also furnishing power for the 20-horsepower motor just installed by J. Ed Mitchell for pumping out seepage water on his place, formerly the Portman ranch.

The company is also supplying power to George Sellers for his 7-horsepower motor, which he is using for irrigation on his model ranch near Knightsen. He is greatly pleased and says it is the only power. Mr. Sellers is the first to adopt this mode of irrigation in that section.

Clarence D. Smith, formerly of the Mt. Diablo Light and Power Company of Tracy, is in the employ of the Pacific Gas and Electric in the commercial department. Clarence is a capable man and well liked by everybody. His many friends will be pleased to learn of his new position.

Byron (Cal.) *Times*, April 26, 1912.

Gas System for Stege

STEGE, April 29.—The Pacific Gas and Electric Company has had its solicitors and agents in and about this place for a week interviewing citizens and obtaining contracts for the using of gas in all the stores and dwellings of the town. The result annonuced today is that every family and business house called upon has signed a contract for the gas and work is to commence at once laying mains from the main pipe line running down San Pablo Avenue. The town as well as the stores and dwellings will be lighted and in another month the mains will be laid and the system installed.

Oakland (Cal.) *Tribune*, April 29, 1912.

Domestic Science Lessons

LESSON X.—PUDDINGS AND ICES.

By MRS. H. ROSE STEWART

NESSELRODE PUDDING

Cook twenty large chestnuts (peeled and blanched) in sugar syrup until tender. Cut six of the nuts in small pieces, and press the rest through a sieve. Cook two ounces, each, of currants and sultana raisins in syrup until tender. Then add, with two ounces of preserved fruit, pineapple, cherries, etc., to the pieces of chestnut, and let cool in syrup. Cook the beaten yolks of four eggs, mixed with three-quarters cup of sugar, in one pint of scalded cream until the mixture coats the spoon. Add the sifted chestnuts and pass the whole through a fine sieve. When the mixture is cool, partly freeze. Then add a cup of whipped cream and finish freezing; beat in the fruit.

SAUCE FOR NESSELRODE PUDDING

Beat the yolks of three eggs until thick. Add three tablespoonfuls of sugar, and beat again. Stir over the fire in a double-boiler until the mixture thickens a little. Then pour into a cold dish, and beat until it is cold, light and creamy. Flavor to suit the taste, and then mix in lightly a cup and a half of cream whipped to a dry, stiff froth.

NEAPOLITAN WHIP

Mix a half pound of chopped walnuts with a half pound of chopped fresh marshmallows. Blend with the mixture enough whipped cream, flavored with Vanilla, to hold it together. Serve in glasses with fruit sauce.

ENGLISH PLUM PUDDING

½ lb. Bread Crumbs
¼ lb. Flour
½ lb. Raisins
½ lb. Currants
2 oz. Almonds
½ lb. Suet
½ lb. Sultanas
2 oz. Candied Peel
1 lb. Sugar
Rind and juice of two Lemons.
4 Eggs
1 teaspoon mixed Pudding Spice, and a little Milk

Mix all together place the mixture in a buttered mould. If the mould has no lid, tie over a floured cloth, and boil six hours. The mixture must not be too moist or the pudding will be heavy.

CHANTILLY PUDDING

1 Moulded Sponge Cake
2 tablespoonfuls Raspberry Jam
½ oz. Chopped Pistachio Nuts
A few Candied Fruits
2 oz. macaroons
1 wineglass Sherry or Brandy
1 gill Cream

Scoop out the centre of the cake, rub the jam through a sieve and with it paint the outside. Sprinkle with the nuts, fill the center with macaroons crumbs and fruit, pour over the sherry, whip the cream to a stiff froth and pile high on the top.

MARMALADE PUDDING

¼ lb. Suet
¼ lb. Bread Crumbs
¼ lb. Sugar
2 oz. Flour or ground Rice
2 tablespoons Orange Marmalade
1 Egg
½ teaspoon Baking Powder
1 tablespoon Milk

Finely chop the suet and put it in a bowl, add the flour, sugar, bread crumbs and baking powder. Mix well together. Beat the egg until light, then beat into it, the milk and marmalade, mix altogether, pour into a well greased mould. Twist over a sheet of paper, and steam four hours.

ICE PUDDING

¼ lb. Raisins
1 pint Milk
Yolks of 2 Eggs
¼ lb. Powdered Sugar
2 oz. Sweet Almonds
2 oz. Candied Cherries
2 oz. Citron
1 inch stick of Cinnamon
1 pint Cream
2 Limes

Stone the raisins, and simmer them and the cinnamon in the milk twenty minutes. Beat together the yolks and sugar, strain over them the milk, return to the saucepan and stir till the mixture begins to thicken. Put it then on one side to cool. Blanch the almonds and chop them finely. Cut the limes into quarters and the citron into thin slices, add all these with the raisins, and cherries to the custard. Stir in the cream and freeze. When firm press into a mould which has been rinsed with cold water and pack into ice one hour.

CHOCOLATE PUDDING

¼ lb. grated Chocolate
1 pint Milk
½ oz. Gelatine
2 oz. Sugar
1 teaspoon Vanilla
Yolks of 4 Eggs
⅓ gill of cold water

Soak the gelatine in the water, put it in a saucepan and stir over the fire till melted, do not let it boil, allow it to cool a little. Mix together the milk and grated chocolate, stir over the fire until boiling. Beat together the yolks of egg and sugar. Pour over the chocolate mixture, return to the saucepan and stir over the fire two minutes, add the vanilla and melted gelatine. Put in a mould and allow it to set.

BROWN BETTY

Put into a buttered baking dish a layer of sliced applies; sprinkle with sugar and cinnamon and cover with soft bread crumbs. Continue this process until the dish is full, having the top layer bread crumbs. Dot it all over with small pieces of butter, add a few spoonfuls of hot water, and bake in a moderate oven until apples are tender. Serve hot with vanilla sauce or cream.

APPLE SNOW

Stew some sour apples until soft, sweeten to taste and strain through a wire sieve. To each pint of apple add the white of one egg, whisk very briskly until it is stiff and white, then heap it up in a preserve dish and pour around it some whipped cream, sweetened to taste, or a nice boiled custard.

NUT PUDDING

Cream a quarter cup of butter and half cup of sugar and beat into this a half cup of chopped nuts. Beat the yolks of two eggs light and add to the mixture with a half a cup of milk. Sift two cups of pastry flour with two tablespoonfuls of baking powder, and add to the mixture, beating thoroughly. Then add the stiff whites and a little salt, and steam in greased cups for half an hour. Serve with a hard sauce, flavored with Lemon Extract.

RAINBOW PUDDING

1 package of Gelatine
1 cup of hot water
1½ cup sugar
3 cups of unwhipped white of Eggs
1 level teaspoonful of Cream of Tartar

Put the cream of tartar with the eggs and whip in a large bowl to a stiff froth; put the sugar in slowly; when the gelatine is dissolved and the water is cool, add slowly.

Divide the mixture into five parts and flavor these with almond, pistachio, peach, orange or other flavors. Color in different hues and return in layers to the larger bowl. Set the bowl in warm water to loosen the pudding, then invert on a platter and shake out the pudding as from a mold. Serve with whipped cream and powdered sugar.

CARAMEL ICE CREAM

Cook two cupfuls of brown sugar in a skillet, stirring it all the time until it is smooth and thin, then add a little hot water and cook until it thickens. Dissolve the mixture in three pints of cream, flavor with two teaspoonfuls of vanilla, and freeze.

FROZEN DESSERTS

In frozen deserts, the results depend more upon the flavoring you use, than in any other kind.

Ice or snow and salt are required for the process of freezing. The salt melts the ice, and in melting absorbs heat from the mixture, thus causing it to freeze. The finer the ice the more quickly the freezing will be accomplished. In packing the freezer allow three measures of ice to one of salt. The can should not be filled more than three-quarters full, as the liquid expands in freezing, and, if overcrowded the cream will become coarse grained.

After freezing the water should be drawn off from the freezer, and it should be packed anew with ice and salt and allowed to stand an hour or more. This makes the ice cream richer as well as improving the flavor. The best ice cream is made from cream and sugar, flavored with fruit, nuts or an extract. Any other substances such as gelatine, corn starch or powders, simply thicken the cream, without making it richer.

Ice cream that you buy as a rule is cheaper than home ice cream, because it contains condensed milk, corn starch, and other thickening substances as substitutes for sweet rich cream. Besides, it is usually flavored with some cheap rank extract, and it cannot be compared with the home made article. Try it and see.

FROZEN PUDDING

Scald one cup of cream and mix with it two cups of sugar, and one-half a teaspoon of salt. Turn into it a quart of boiling milk. Stir constantly until the mixture is smooth. Then continue to stir at intervals for twenty minutes. When cold stir in four eggs beaten until they are foamy, and one pint of stiffly whipped cream. Flavor with two teaspoonfuls of Vanilla. When partly frozen stir in one-half pound candied cherries, plums, apricots, pineapples, and about two ounces of pistachio nuts sliced thin, and, if desired, a wine glass of sherry.

FRUIT CREAM

Mix well together one pint of cream, one-half pint of milk, one cupful of maple syrup, one-half cupful of chopped figs, one-half cupful of almonds, one can of peaches, or one-half dozen peeled and stoned fresh peaches, and one teaspoonful each of vanilla and orange extract.

Place in freezer and freeze in the usual manner.

LEMON SAUCE

One cup of sugar, one-third cup of butter, two tablespoonfuls of corn starch, a pinch of salt, two cups of boiling water. Cook in the upper part of a double boiler until it thickens. Just before serving add one egg, beaten until light, and one-half a lemon cut into small pieces. This sauce is also nice served with apple dumpling.

CANNED FRUIT SAUCE

Take the syrup from any canned fruit, add sufficient sugar to sweeten, and an equal quantity of boiling water. Measure, and for one pint thicken with one tablespoon arrowroot blended in a little water. Boil ten minutes; add one tablespoon butter and stir until melted.

CURRANT JELLY SAUCE

Melt one cup red currant jelly, add one glass white wine, and one teaspoon extract raspberry.

CURRANT JELLY SAUCE NO. TWO

Cream two tablespoons butter; add gradually three-fourths cup stiff currant jelly slightly softened by standing in a warm room. Beat well and serve very cold.

CREAM SAUCE

Bring two-thirds pint cream slowly to boil; set in stewpan boiling water; when it reaches boiling point add sugar, then pour slowly on whipped whites of two eggs in bowl; add one teaspoon extract vanilla and use.

CUSTARD SAUCE

One pint milk, yolks of four eggs, one-half cup sugar. Set over fire and stir until thick.

CREAMY SAUCE

Cream two tablespoons butter; beat in by degrees one-half cup sugar, two tablespoons each of thick cream and sherry. Beat long and hard. Just before serving stand bowl over hot water and beat till sauce looks creamy but is not hot enough to melt the butter.

DUCHESSE SAUCE

Boil two ounces grated chocolate in one-half pint milk five minutes; strain on two yolks of eggs beaten with one-half gill cream and one-half cup sugar; strain, return to fire, stir until thick as honey; remove and add one teaspoon extract vanilla.

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PACIFIC GAS AND ELECTRIC COMPANY

CITIES AND TOWNS SUPPLIED WITH GAS, ELECTRICITY, WATER AND RAILWAY

Service Furnished	Number of Towns	Total Population
Electricity	187	1,081,222
Gas	49	978,167
Water	10	45,825
Railway	1	60,000

Place	Population	Place	Population	Place	Population
Alta	20	Fairfield	834	Pacheco	200
[1] Alameda	25,000	Forestville	100	Penryn	250
[2] Albany	800	Felton	300	Patterson	300
Amador City	200	[1] Fresno	30,000	Penn Grove	300
Adams John	25	[2] Fair Oaks	250	[2] Petaluma	5,500
Alleghany	200	Folsom	1,800	[2] Piedmont	1,720
Alta	25	Gilroy	2,000	Pike City	200
Angel Island	280	Glen Ellen	500	Pinole	1,500
[5] Auburn	2,375	Gold Run	100	Pittsburg	2,372
Agua Caliente	100	[5] Grass Valley	4,500	Pleasanton	2,000
Alvarado	900	Gridley	1,800	Point San Pedro	20
Antioch	3,000	Groveland	125	Port Costa	600
[2] Barber	500	Guerneville	500	[2] Redwood City	3,200
[2] Belmont	350	Hammonton	500	[2] Richmond	10,000
Ben Lomond	800	[2] Hayward	4,000	Rio Vista	884
Belvedere	1,000	[2] Hillsborough	1,000	[5] Rocklin	1,000
Benicia	3,360	Hollister	3,000	[6] Roseville	2,600
[2] Beresford	25	Hookston	75	Rodeo	500
[2] Berkeley	40,000	Ignacio	100	[2] Rosa	500
Biggs	750	Ione	900	[4] Sacramento	60,000
Big Oak Flat	20	Irvington	1,000	San Andreas	200
Brentwood	200	Jackson Gate	100	[2] San Anselmo	1,500
Broderick	200	Jackson	2,035	[2] San Bruno	1,5[illegible]
Brown's Valley	50	Kennedy Flat	20	[2] San Carlos	[illegible]
Byron	200	[2] Kentfield	250	[2] San Francisco	[illegible]
[2] Burlingame	4,000	Knight's Landing	350	[2] San Jose	[illegible]
California City	25	Lake Francis	5	[2] San Leandro	[illegible]
Camp Meeker	200	Lathrop	300	San Lorenzo	[illegible]
Campbell	600	Live Oak	200	[2] San Mateo	[illegible]
Centerville	1,000	Livermore	2,250	[2] San Quentin	[illegible]
Centerville	20	Los Gatos	3,000	[2] San Rafael	[illegible]0
[2] Chico	13,000	Larkspur	600	San Pablo	[illegible],000
[2] Colma	3,500	Lincoln	1,400	Santa Clara	6,000
[2] Colusa	1,500	[2] Lomita Park	100	Santa Cruz	16,000
Concord	1,500	Los Altos	500	Saratoga	50
Cement	1,500	[5] Loomis	400	[2] Santa Ros	12,000
[5] Colfax	500	Martinez	5,000	[2] Sebastopol	1,200
Cordelia	150	Martell	150	Sausalito	2,500
Corde Madero	350	[2] Marysville	7,000	Smartsvil	500
Crockett	2,500	Mayfield	1,500	[2] South Sa[illegible]ciaco	2,500
Crow's Landing	375	[2] Menlo Park	1,500	[2] Stanford [illegible]ersity	2,600
Cupertino	50	Meridian	300	Sonoma	1,200
Daly City	250	[2] Millbrae	300	Stege	1,000
Danville	250	Milpitas	300	[5] Stockton	30,000
Davis	750	Mill Valley	2,500	Suisun	1,200
Decoto	350	Mission San Jose	500	Sutter [illegible]	150
de Sabla	25	Mokelumne Hill	150	Sutter [illegible]k	1,500
[6] Dixon	1,000	Monte Rio	50	Sunnyva	1,500
Dobbins	50	Moulton's Landing	30	Tiburon	400
Davenport	1,000	Mountain View	[illegible]	T[illegible]rme	20
Drytown	20	Mt. Eden	[illegible]	Towle	100
Durham	500	Mare Island	[illegible]	Tracy	[illegible]00
Dutch Flat	500	[2] Napa	[illegible]0	Vacaville	1,200
Duncan's Mills	150	[3] Nevada City	[illegible]0	[2] Vallejo	15,000
[2] Easton	300	New Chicago	[illegible]	Walnut Creek	350
[2] East San Jose	1,660	Newark	[illegible]	Warm Springs	200
Eagle's Nest	50	[6] Newcastle	[illegible]	Watsonville	4,500
Edenvale	500	Newman	1,0[illegible]	Wheatland	1,400
Eldridge	500	Niles	80[illegible]	Winters	1,200
Elmira	150	Nicolaus	75[illegible]	[2] Woodland	3,200
El Verano	400	Novato	250	Yolo	400
[2] Emeryville	5,000	[2] Oakland	230,000	Yuba City	1,200
Encinal	100	Oakley	80		
Fairfax	500	[2] Palo Alto	6,300	Total	1,136,222

Unmarked—Electricity only.
1—Gas only.
2—Gas and Electricity.
3—Gas, Electricity and Water.
4—Gas, Electricity and Street Railways.
5—Electricity and Water.

EMPLOYS 4,500 people.
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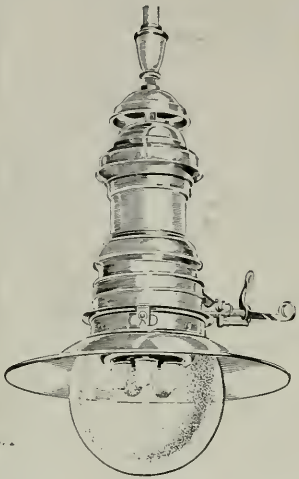
17 gas works.

SERVES ⅔ of California's population.
30 of California's 56 counties.
An area of 37,950 square miles.
⅜ the size of New York State.
½ the size of all the New England States combined.



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It is just as important that the best gas arc lamp be purchased as it is the best material for plant equipment. The best always means minimum depreciation and maintenance cost.

Humphrey Outdoor Arc Lamps are constructed by gas men for gas men.

"Built to Stand Hard Service"

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